FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

IT seems to be nearly time some authoritative statement was made regarding the chairmanship of the Air Board. Nearly a fortnight ago it was categorically stated that Lord Cowdray had resigned. Inquiry at headquarters only elicited the stereotyped reply that "no statement could be made," and even though Parliament has been sitting for more than a week since it reassembled after the recess, nothing official has been said either in or out of the House. The consequence has been that a veritable crop of rumours has been rife. One says that Lord Cowdray has *not* resigned. Another that he adheres to his decision—which has never been announced with authority—and that it has been settled he is to be succeeded by any one or two or three probables. The political correspondent of the *Manchester Guardian*, who is usually well-informed, says that Mr. Churchill has actually accepted the post. The *Times*, on the other hand, states definitely that Mr. Churchill has not even been offered the chairmanship, which, it says, is very likely to become vacant very soon. Between report and counter-report the plain man becomes a little confused in the issues.

The Chairmanship of the Air Board.

As we have said, it is high time some steps were taken to clear up the mystery surrounding the matter in question. It is not that we, or any other responsible people, are dying of curiosity to know to whom is to fall the mantle of Lord Cowdray, supposing he really has resigned or intends to do so, but it is certainly not good either for the Air Service or the nation that such a state of uncertainty should continue. If the present chairman has decided to vacate his post, then the fact should be announced immediately, so that the tongue of rumour may be silenced. The attitude of silence preserved by the administration savours of cynical contempt of the public, which certainly has the right to know when one of its most important servants retires in the middle of a great war, and it is further entitled to be told as early as possible who has been selected to succeed him. If, on the other hand, there is no change pending, some announcement ought to be made without delay with the same view of stifling rumour. It is quite germane to the issue to ask what the enemy must think about the state of disorganisation in our conduct of important affairs which is implied. Let us hasten to say that we do not think the essential work of the Air Board is suffering at all, but when we hear, week after week, these constant rumours of resignations and impending appointments we cannot get away from the fact that those who desire to read hesitancy and disorganisation of policy into it are not without some show of justification for their opinion. It is doubly unfortunate that it is the Air Board which is concerned. That very mutable body has been through the melting pot so often, and its various reorganisations have been the subject of so much recrimination, that any suggestion of uncertainty now is to be deplored. By all means, then, let the situation be cleared up once and for all.

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America and the War.

From the day it became certain that America would enter the war on the side of the Allies, "FLIGHT" has taken the lead in insisting that her best service to the Entente cause could be given by the immediate creation of a huge aerial force. With her enormous manufacturing facilities and her immense material resources, the United States can at a very early date indeed place the command of the air beyond all manner of doubt for the period of *this* war, at any

rate. It is with peculiar satisfaction, therefore, that we learn, through the Washington correspondent of the *Daily Telegraph*, that America's first contribution is to take the shape of a very substantial reinforcement of our air forces in the West. According to the *Telegraph* correspondent, the United States War Office is now considering a plan for creating an American aeroplane force strong enough to "blind the eyes of the German armies." It is approved as practicable by the members of the Aircraft Construction Board, a Government Department created less than a month ago, and also by the various American aviation societies which have been working independently to secure full scope for the employment of the vast resources which America possesses for the enrolment of a splendid army of flying men and the construction of an unlimited number of machines.

As to whether the War Office plan will materialise, and to what extent, depends very largely on the recommendations by the Commissions representing the Allied countries. One of the leading supporters of the plan is Rear-Admiral Bradley Fiske, who considers that such a force as suggested would be one of the quickest ways of ending the war. In the meantime letters have been received by the chairmen of the Military Committees of Congress from the Aero Club of America and other aviation bodies, urging Congress to vote £100,000,000 for the immediate training of 10,000 aviators, and the purchase of 40,000 machines "just by way of a start."

That sounds like a very healthy "start!" Certainly the idea does not err on the side of being too limited in outlook. Whether the whole gigantic scheme will materialise into accomplishment before the end of the war remains to be seen, but what pleases us most is that its enunciation proves that the Americans do not intend to do things by halves. They apparently realise that it is far better to set out with a plan more extensive in scope than can be brought into line with practice than to peddle with little schemes that lead nowhere in particular. Whatever else may happen, we may rest assured that America means the Allies to have at the earliest possible moment such a preponderance of aerial force that the eyes of the enemy will, as they say, be completely blinded. What that means in modern war we have been able to see as we have read the despatches from the various fronts, and particularly the more recent ones relating to this year's battles in the West. What the nation really owes to the valour and efficiency of the Air Services will not be known until all is over and we can sit down to read the plain uncensored stories that will be set down by competent eye-witnesses of their deeds. Even then we shall never be able to grasp the full measure of their service to the nation, particularly during that period when the enemy had a clear lead in numbers and quality of his machines. Fortunately that period is past, and we are now in a better relative position than we have ever been. Never again would the enemy be able to establish an aerial superiority, even if we had to continue to stand alone with our old and tried Allies. But with America and her vast resources at our backs—well, the situation holds no misgivings for the future.

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Last Week's Aeroplane Raid.

We have a shrewd suspicion that the enemy does not regard his attempt on the Thames Estuary last week as an unqualified success. True, the sixteen or so aeroplanes that succeeded in getting over south-eastern England did manage to do some minor damage and caused some regrettable loss of life, but when we remember that toll was taken of them to the number of ten machines, we are entitled to claim that the honours rest with the defence. As we pointed out in discussing the Folkestone raid, it is impossible to *prevent* these raids altogether, but it is possible to cure the enemy of his predilection for embarking on them. The experience he underwent in this last raid is certainly calculated to damp his ardour, and a few more such forays ought to drive home the realisation that the game is not really worth the candle. It is as well, however, to realise that the one lesson will not be enough to effect a cure. If the German raiders had really succeeded in causing any serious military damage in the great naval centre they attacked, the raid would, from their point of view, have been fully justified even when the cost to themselves is counted in. The mere loss of ten machines and about twenty men does not weigh in the balance at all. What does count is the effect achieved in relation to the inevitable price to be paid. In the case under discussion the effect was not worth it, and by the time the enemy has made half-a-dozen more such raids and has discovered that he has to pay without effecting anything worth while, he will abandon aeroplane raids as he has dropped invasion by Zeppelin. It is very satisfactory to know that our defences have been brought to such a state of perfection as is disclosed by the results to the enemy, and we can rest assured that subsequent raids will meet with no better fate than that of last week. But we shall have more of these visitations before long—they are an inevitable corollary of war as made by the Hun.

It is not without interest to note, in this connection, the speech made in the House the other night by Mr. Macpherson at question time. He remarked that we had at the present time airmen flying at the Front who were the most gallant men in the world, with really magnificent machines. They were inflicting on the Germans, almost daily, Folkestone raids, and were contributing relatively as much to the break-down of the morale of the Germans in Flanders and particular parts of Germany as any part of our fighting forces. What we like about this is the statement about "particular parts of Germany." It looks as though the Government had realised that the proper policy is to hit the Hun where he feels it most—at home—and not to say too much about it here. There has been quite enough milk-and-water talk about the iniquity of reprisals—talk that achieves no other end than to persuade the enemy that he has friends here who do not like to see him hurt. The best way of stifling that sort of talk is to hit him and say nothing—and to let him do all the squealing.

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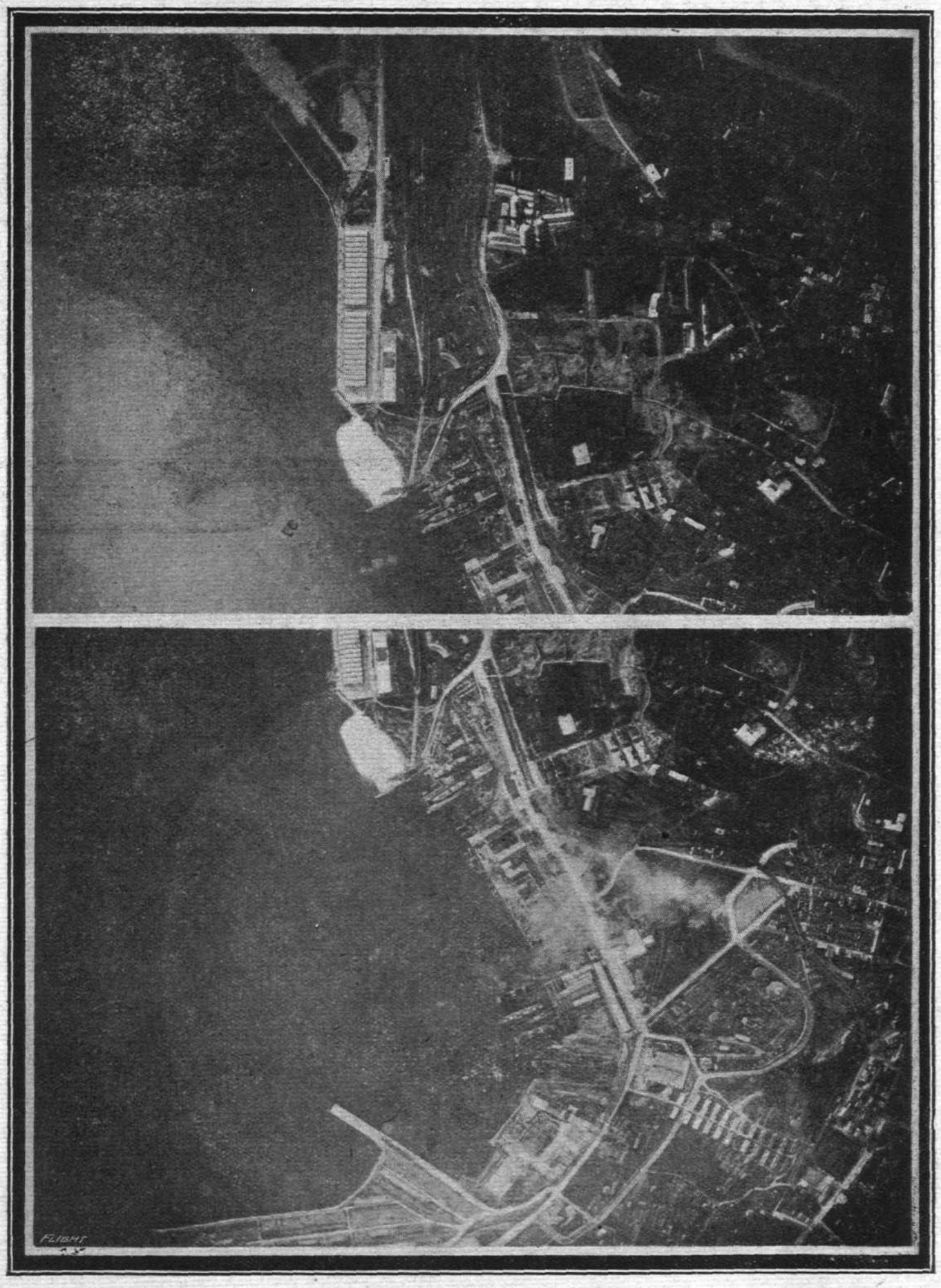
Zeebrugge.

It has been with universal satisfaction that the news has been received of the continuous attacks by air and sea on that nest of pirates, Zeebrugge. Of how many tons of high explosive have been dropped on the town and its defences during the past fortnight we have lost count, but it has been a considerable amount, and has undoubtedly given the enemy something to think about. Added to the air attacks, which have been many, the ships of the Dover Patrol have also been giving the place a fair amount of attention. Not only Zeebrugge but Ostend and the other Hun-nests along the Belgian coast have been subjected to



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FROM "THE WAR IN ITALY."—Above: A "snap" of three bombs which dropped from an aeroplane during the air raid on September 13th, 1916. Below: The explosion of the three bombs on the target—the Lloyd Arsenal at Trieste—and the fires caused.

intense bombardment from air and sea, with the result that the enemy appears to have found Ostend untenable as a port and to have removed all his ships from that unhealthy locality. Unfortunately, the principal nest, Zeebrugge, seems to have become too strong to be rendered similarly untenable without lengthy and expensive attacks which our naval and military authorities seem determined to press now that they have been commenced in earnest. The mistake made was in the beginning, when the Germans first occupied the place and began to fortify it. Then was the time that it might have been made too hot to hold—it should never have been allowed to grow into practically a first-rate fortress. Our naval authorities have been severely criticised for their apparent lethargy in this, but as a matter of fact the whole of the blame does not lie at their door. Other weighty considerations have operated, which had nothing to do with the Admiralty, to prevent the carrying out of what was unquestionably the proper policy. Had our own people been given the full opportunities necessary, Zeebrugge would never have become what it is to-day—one of the most powerful coast fortresses in Europe. At the same time, the British Government cannot be acquitted of all blame in the matter. In war nothing should be allowed to weigh but military necessity—political considerations should all go by the board. Had the principle been properly recognised in the beginning, there would have been no Zeebrugge to reckon with. However, tardily enough these considerations of which we speak have been relegated to their proper place in the scheme and Zeebrugge is marked out for constant attack and, if it is militarily possible, destruction. It will be an intensely difficult task and one that would be practically impossible of achievement were it not for the co-operation of aircraft. There are limits to the power of naval forces when opposed to well-conceived shore fortifications, as we learnt to our cost in the Dardanelles. We know that the fortifications of Zeebrugge have been thoroughly well developed in accordance with all the latest theory and practice, of which the Germans are past masters. The whole coast bristles with heavy ordnance, naval guns up to 15-in. calibre in large numbers having been installed among the low-lying dunes with which this part of the coast abounds. Then what may be called the permanent fortifications of the port itself have been brought to a high state of efficiency, while the approaches have been made as safe from attack as is humanly possible by a very complete system of minefields, with the services of a powerful mosquito fleet to watch and protect them. It is, therefore, thanks mainly to our superiority in the air that we are able to seriously entertain the possibility of reducing this formidable fortress to impotence. Without aerial observation gun-fire from ships which cannot approach within 10 miles in safety would, naturally, be blind and robbed of nine-tenths of its effect. Even supposing that maximum effect of fire could be produced without the services of aircraft, the job would be more difficult and would take infinitely longer were it not possible to discharge many tons of explosives from the air, as our seaplanes have been doing for a month past. Truly, if there is one arm that more than another dominates the operations of modern war it is the aerial. No matter what phase or what aspect of war we consider, we find that aircraft in superior numbers provide the ultimate factor, and that is almost as true at sea as it is ashore. The toy of yesterday has become the decisive element of to-day. And when we are able to realise this we get to the main conclusion, from which there is no escape, that supremacy in the air now and for all time is absolutely vital to the existence of the British Empire. That is an issue which we must never allow to be obscured by the mists that are bound to arise when at last the Great War shall have become history and the professors are wrangling about its "lessons." The main lesson, after "preparedness" of which it is an essential part, is as we have stated it.

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Upholding Political Honour.

We have received the prospectus of a new society, which is called the Society for Upholding Political Honour, whose objects are :—

1. To attack the abuses of Government by Party, and especially the misuse of Party Funds.
2. To ensure that publicity shall be given to the source and amount and disposal of all monies devoted to Party objects.
3. To insist that Honours shall be bestowed only as a reward for services to the State, and in no case for monetary considerations.
4. To support as Parliamentary Candidates, men of character who are free from Party ties.
5. To free the Press from Party influence.
6. To co-operate (but not to be amalgamated) with other organisations whose aims are wholly or in part identical with those of the Society.
7. Generally to direct attention to all lapses from National or Political Honour.

The aims as set forth are admirable, and no one but the most hardened of political hacks will venture to assert that such an association is not needed. It is doubtful if at any time in our history political morality has ever fallen to so low a standard as of recent years. We have only to look at the last Birthday "Honours" as an object lesson. Everything has been allowed to become subservient to the ends of Party and Bureaucracy, and we are living under a tyranny of system which is only a little less objectionable than the frank and brutal autocracy of Prussia. Indeed, it is really questionable if the latter is not in many ways preferable, since it is at least honest in its pretensions. It does not masquerade as anything but what it is, whereas here we vapour about freedom and representative government where neither in fact exists. We welcome the founding of such a society as the one under discussion, and trust it will have a successful career, for it is high time that Alpheus and Peneus were turned through the Augean stable of British politics. The whole system stinks in the nostrils of decent people—it requires cleansing and disinfecting, and we sincerely wish the society well in its efforts.

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The Folkestone Air Raid.

A deputation, consisting of the Mayor of Folkestone (Sir S. Penfold), the Deputy Mayor (Alderman Spurgeon), the Town Clerk, and the Chief Constable waited on the Earl of Derby at the War Office on June 11 in reference to the recent air raid.

Lord Derby informed the deputation confidentially of the measures taken for the local defences of the South Coast towns. The whole question had been thoroughly considered in the light of recent experience, and steps taken with a view to increase security against similar raids in the future, including an improved system of warning on all occasions where such warning was possible.

On the 8th inst. Sir George Cave, K.C., the Home Secretary, received the deputation at the House of Commons, and discussed with them questions arising out of the recent enemy air raid on the South-East coast. Among other matters the presence of aliens in the area affected was dealt with.

FLIGHT

THE BURGESS "B.P." PRIMARY TRAINING TRACTOR BIPLANE.

IN order to meet the requirements of the U.S. Army for a machine for the primary training of pilots, W. Starling Burgess, of the Burgess Co., Marblehead, Mass., U.S.A., designed the tractor biplane described and illustrated herewith. The main characteristic of this machine is in the seating arrangement, the instructor and pupil being seated side by side—an arrangement which is preferred by some instructors.

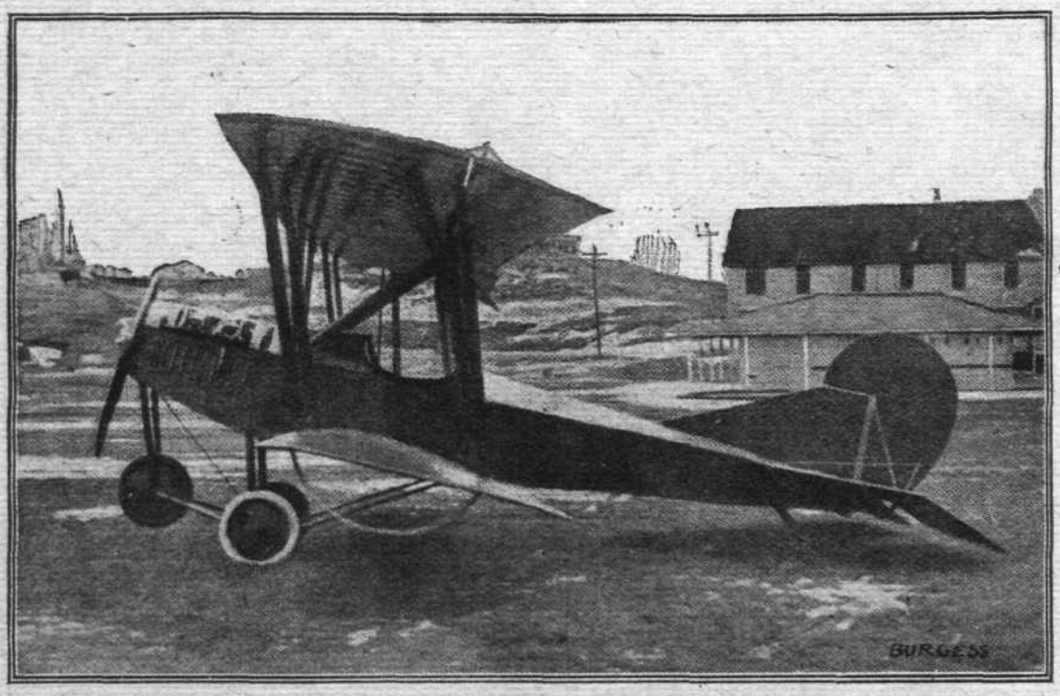
The extra width of the *fuselage* at the cockpit due to this seating arrangement is by no means excessive, and, indirectly, is the means of producing a *fuselage* of nearly perfect streamline form. The general appearance is also added to as a result of this larger width.

Another noticeable feature is in the arrangement of the interplane struts. These are not only inclined forward, as a result of staggering the top plane, but they are also inclined outwards—a practice common with several types of Austrian machines. It will also be noticed that they are inclined outwards at angles which increase from the innermost to the outermost struts.

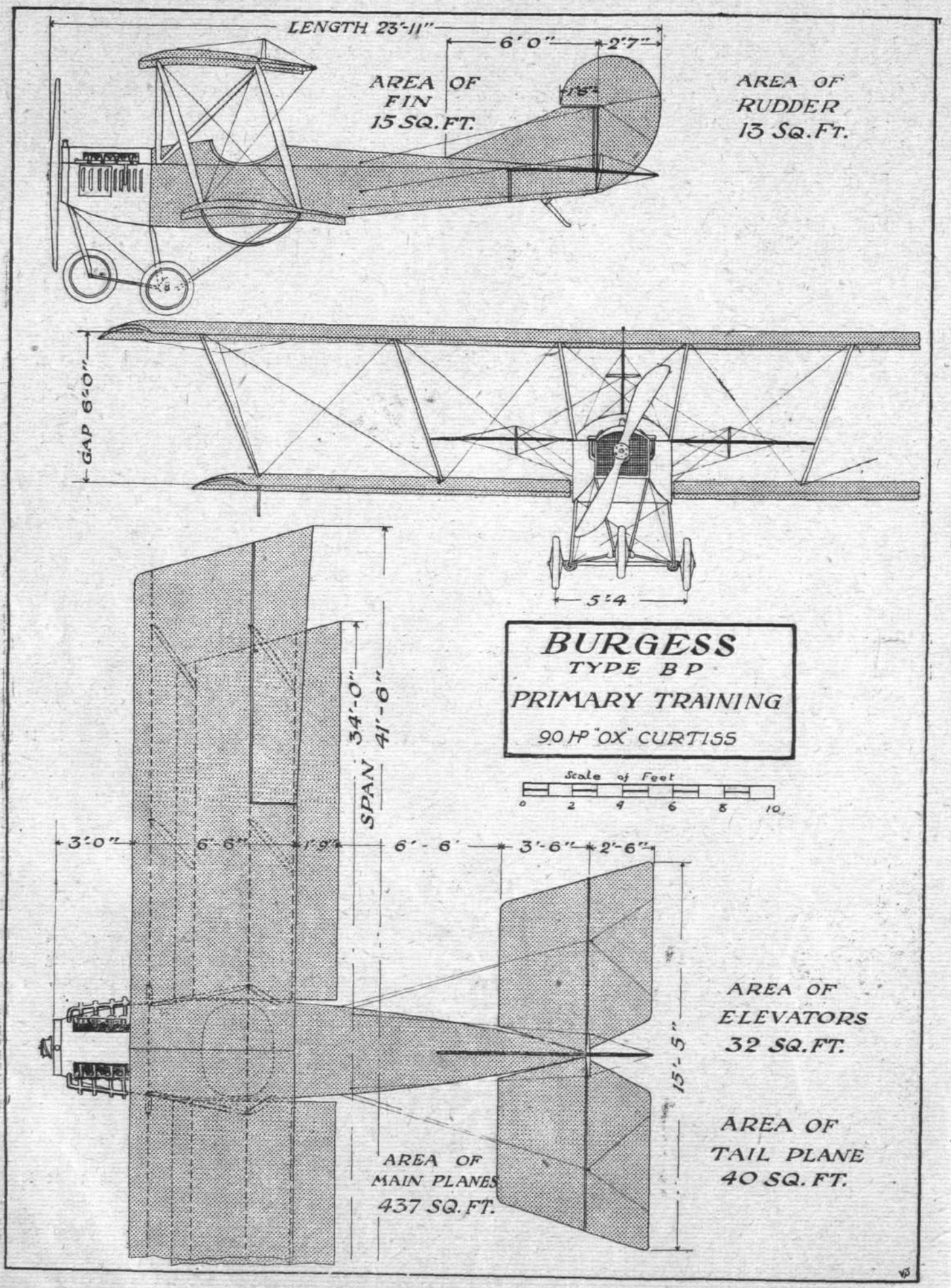
Throughout the whole machine, simplicity of construction, combined with strength, have been the two considerations that have received the designer's attention, and in both experimental and official trials the machine gave very satisfactory results. The large plane area, 437 sq. ft., and the wing section, R.A.F. 3, render the machine comparatively slow and easy for the pupil to handle.

Both top and bottom planes are in two sections each, the top joined at the centre, and the bottom attached to the *fuselage*. The dihedral angle of both planes is $\frac{3}{4}°$ and the angle of incidence is $1\frac{1}{4}°$. The top plane is staggered forward 1 ft. 9 ins. The main spars are spaced 4 ft. apart, the forward spar being located 9 ins. from the leading edge. The attachment of the interplane struts occurs at the following distances from the centre :—*Fuselage* struts, 2 ft. 8 ins.; middle struts, 9 ft. $1\frac{1}{2}$ ins. (top), 7 ft. 2 ins. (bottom); outer struts, 16 ft. 9 ins. (top), 14 ft. 5 ins. (bottom). The wing-tips are raked 16°. *Ailerons*, of 18 sq. ft. area each, are hinged to the rear spar of top plane only. The area of the top plane, excluding

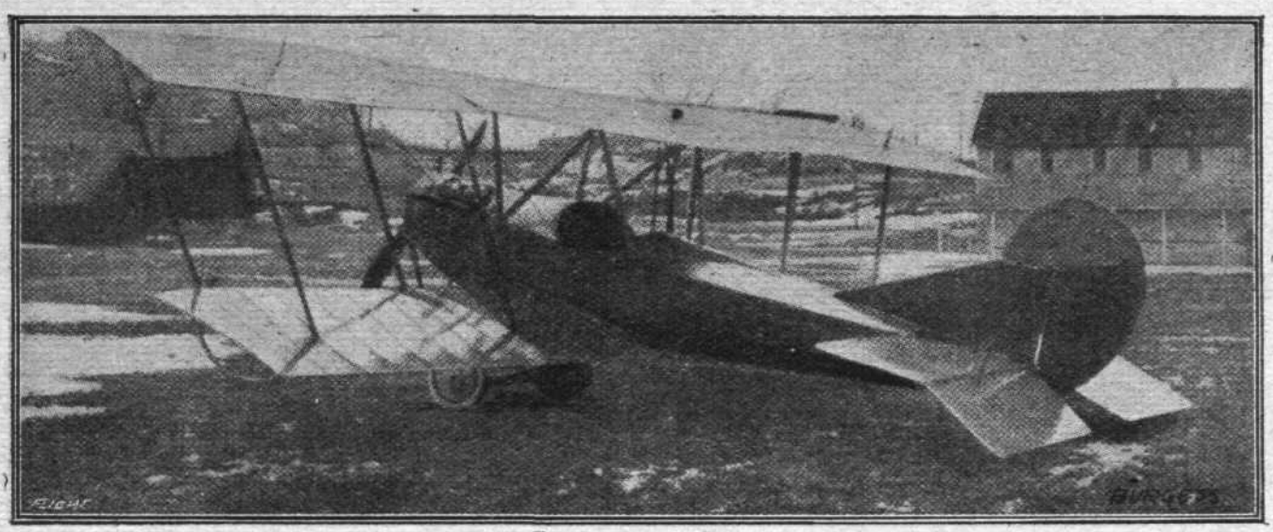
Three-quarter front view of the Burgess training tractor biplane. In this view the arrangement of the struts is clearly shown.



Side view of the Burgess training tractor biplane.



THE BURGESS TRAINING TRACTOR BIPLANE.—Plan, side and front elevation to scale.



Three-quarter rear view of the Burgess training tractor biplane.

ailerons, is 219 sq. ft., and that of the lower plane 182 sq. ft.

The tail surfaces, which are of somewhat ample proportions, consist of a stabilising plane in two sections, mounted one on each side of the *fuselage*, having elevator flaps hinged to the trailing edge. A balanced rudder is pivoted on the tubular stern post, and in front is a triangular vertical fin. The stabiliser is supported at its forward end by tubular struts.

The *fuselage* is of rectangular section tapering to a vertical knife-edge at the rear. The length from the nose to stern post is 21 ft. 2 ins. The maximum width and depth, at cockpit, is 4 ft. and 2 ft. 6 ins. (3 ft. 7 ins. over turtle deck) respectively. The top *longerons* are parallel to, and 7 ins. above, the line of thrust. Mounted in the nose, in front of the engine, is the radiator, measuring 2 ft. 2 ins. high by 2 ft. 3 ins. wide.

The landing chassis is of the three-wheel type, all three being 26 ins. by 3 ins. disc. The two main wheels are mounted on a tubular axle, running in metal guides and carried by two pairs of tubular steel V-struts. The forward wheel is rigidly supported below the nose of the *fuselage* by a pair of tubular steel struts. The latter, together with the forward members of the V-struts, are provided with wood streamline fairings. A pair of horizontal tie-rods also connect the front wheel and the main axle.

The general dimensions are as follows:—Span, top 41 ft. 6 ins., bottom 34 ft.; chord, 6 ft. 6 ins.; gap, 6 ft.; stagger, 1 ft. 9 ins.; supporting surface, 437 sq. ft.; overall length, 23 ft. 11 ins.

HONOURS.

Two New V.Cs.

THE following awards of the Victoria Cross were announced in a supplement to the *London Gazette* for June 8th:—

Lieut. (Temp. Capt.) ALBERT BALL, D.S.O., M.C., late Notts and Derby R. and R.F.C.—For most conspicuous and consistent bravery from April 25th to May 6th, 1917, during which period Capt. Ball took part in 26 combats in the air and destroyed 11 hostile aeroplanes, drove down two out of control, and forced several others to land. In these combats Capt. Ball, flying alone, on one occasion fought six hostile machines, twice he fought five, and once four. When leading two other British aeroplanes he attacked an enemy formation of eight. On each of these occasions he brought down at least one enemy. Several times his aeroplane was badly damaged, once so seriously that, but for the most delicate handling, his machine would have collapsed, as nearly all the control wires had been shot away. On returning with a damaged machine he had always to be restrained from immediately going out on another. In all, Capt. Ball has destroyed 43 German aeroplanes and one balloon, and has always displayed most exceptional courage, determination and skill.

Lieut. FRANK HUBERT MCNAMARA, Aus. Forces, R.F.C.—For most conspicuous bravery and devotion to duty during an aerial bomb attack upon a hostile construction train, when one of our pilots was forced to land behind the enemy's lines. Lieut. McNamara, observing this pilot's predicament, and the fact that hostile cavalry were approaching, descended to his rescue. He did this under heavy rifle fire, and in spite of the fact that he himself had been severely wounded in the thigh. He landed about 200 yards from the damaged machine, the pilot of which climbed on to Lieut. McNamara's machine, and an attempt was made to rise. Owing, however, to his disabled leg, Lieut. McNamara was unable to keep his machine straight, and it turned over. The two officers, having extricated themselves, immediately set fire to the machine and made their way across to the damaged machine, which they succeeded in starting. Finally Lieut. McNamara, although weak from loss of blood, flew this machine back to the aerodrome, a distance of 70 miles, and thus completed his comrade's rescue.

Medals for the R.F.C.

THE following awards of the Distinguished Conduct Medal were announced on June 5th:—

1660 Flight-Sergt. G. GREENFIELD, R.F.C.
279 Sergt. (A. S./M.) C. E. KING, R.F.C.
1908 Corpl. E. LANGRIDGE, R.F.C.
147 Sergt. T. J. MOUNTFORD, R.F.C.
6729 1st Air-Mech. E. ROGERS, R.F.C.

The following awards of the Meritorious Service Medal for valuable services rendered with the Armies in the Field were also announced:—

16796 Sergt. W. ANDERSON, R.F.C.
266 Sergt. (A. S./M.) J. A. ASPINALL, R.F.C.
6682 Corpl. T. A. BATES, R.F.C.
1087 Flight-Sergt. C. W. BROWN, R.F.C.
950 A. S./M. C. E. H. BUNTING, R.F.C.
291 Sergt. (A. S./M.) J. F. CLARKE, R.F.C.
2131 Flight-Sergt. H. COOPER, R.F.C.
1576 Sergt. G. H. HALL, R.F.C.
39825 Sergt. (A. S./M.) R. W. HARRISON, R.F.C.
1374 Sergt. G. JAPPE, R.F.C.
4254 Flight-Sergt. J. W. KELLETT, R.F.C.
10942 Flight-Sergt. E. A. LANE, R.F.C.
59 Flight-Sergt. J. LONGHURST, R.F.C.
16262 Corpl. T. H. MOORE, R.F.C.
1085 Flight-Sergt. (A. S./M.) M. O'CONNOR, R.F.C.
4234 Flight-Sergt. H. Peters, R.F.C.
26950 Sergt. H. H. RIDLEY, R.F.C.
5444 Flight-Sergt. W. THOMASON, R.F.C.
2507 Flight-Sergt. C. TREVETT, R.F.C.

THE ROLL OF HONOUR.

REPORTED by the Admiralty:—

Killed.

Flight Sub-Lieut. D. A. Duncan, R.N.
Flight Sub-Lieut. H. D. M. Wallace, R.N.

Previously Missing, now Unofficially reported Killed.

Flight Sub-Lieut. J. M. Ingham, R.N.
Sub-Lieut. J. E. Maxwell, R.N.V.R.
Flight-Lieut. H. R. Wambolt, R.N.
Flight Sub-Lieut. J. R. White, R.N.

Died of Wounds.

Flight Sub-Lieut. W. E. Archard, R.N.

Died as Prisoner of War.

Flight Sub-Lieut. B. A. Trechmann, R.N.

Accidentally Killed.

Flight Sub-Lieut. John W. Chuter, R.N.
Flight Sub-Lieut. A. C. Dissette, R.N.
Sub-Lieut. Aubrey W. Henton, R.N.V.R.
Prob. Flight Officer W. W. Pitt, R.N.

Previously reported Missing, now Officially presumed Killed.

Lieut. Ivan Heald, R.N.V.R., attached R.F.C.

Accidentally Injured.

Prob. Flight Officer N. P. Playford, R.N.

Wounded.

Flight Sub-Lieut. L. H. Cockey, R.N.
Flight Sub-Lieut. John H. Keens, R.N.
Flight Sub-Lieut. Harold F. Stackard, R.N.

Severely Wounded.

Flight Sub-Lieut. J. F. Nalder, R.N.

Slightly Wounded.

Sqdn. Comdr. (Eng.-Lieut. R.N.) C. D. Breese, R.N.

Missing.

Flight-Lieut. Thomas G. Culling, R.N.
Flight Sub-Lieut. P. C. McNeil, R.N.
Flight-Lieut. Fabian P. Reeves, R.N.
Flight Sub-Lieut. Thomas R. Swinburne, R.N.

Previously Missing, now Unofficially reported Prisoner of War.

Sub-Lieut. H. W. Owen, R.N.V.R., attd. R.F.C.

Previously Missing, now reported Prisoner in Turkey.

217874 Ldg. Mech. W. E. Jones, R.N.A.S.

Reported by the War Office:—

Killed.

2nd Lieut. S. Coates, R.F.C.
Lieut. G. M. Dick, Manitoba, attd. R.F.C.
Lieut. L. A. Fuller, Durham L.I. and R.F.C.
2nd Lieut. B. J. Glynn, R.F.C.
Lieut. G. Inchbold, Sher. For., attd R.F.C.
Lieut. W. E. McKissock, C. Ont., attd. R.F.C.
2nd Lieut. J. A. Morgan, Shrop. L.I., attd. R.F.C.
2nd Lieut. J. L. Murray, R.F.C.
2nd Lieut. A. W. L. Nixon, R.F.C.
2nd Lieut. J. A. O'Sullivan, R.F.C.
2nd Lieut. T. Perkins, R.F.C.
Lieut. W. H. Ritter, R.F.C.
2nd Lieut. W. Sleeman, R.F.C.
2nd Lieut. H. Tennant, Drag. Gds., attd. R.F.C.
6643 2nd Air-Mech. W. E. Giles, R.F.C.
3284 Sergt. R. G. Tollervey, R.F.C.

Previously Missing, now reported Killed.

Capt. A. Ball, V.C., D.S.O., M.C., Sher. For. and R.F.C.
Capt. S. F. Browning, R.F.C.
Lieut. C. G. Eccles, R.F.C.
2nd Lieut. W. Fraser, R.F.C.
2nd Lieut. C. S. Hall, R.F.C.
2nd Lieut. A. R. Johnston, R.F.C.
Lieut. R. G. Masson, E. Ont., attd R.F.C.
Lieut. H. R. Nicholson, Pioneers, attd. R.F.C.
Capt. J. M. E. Shepherd, Rif. Bge., attd R.F.C.
2nd Lieut. J. Smith, R.F.C.
2nd Lieut. H. A. Taylor, R.W. Kent, attd. R.F.C.

Died of Wounds.

2nd Lieut. K. L. Martinson, R.F.C.
77920 2nd Air-Mech. J. H. Wynn, R.F.C.

Previously Missing, now reported Died of Wounds.

Lieut. J. R. Anthony, R. Welsh F. and R.F.C.
2nd Lieut. F. W. Evans, Middx., attd. R.F.C.

Previously Missing, now reported Died of Wounds as Prisoners of War in German hands.

2nd Lieut. F. Allinson, Queen's (R.W. Surrey), attd. R.F.C.
2nd Lieut. S. Harryman, Glos., attd. R.F.C.
Lieut. J. K. Ross, R.F.C.
Capt. H. Tomlinson, M.C., R.F.C.

Accidentally Killed.

8106 Sergt. W. B. Roberts, R.F.C.

Died.

51684 2nd Air-Mech. J. Drain, R.F.C.
65874 2nd Air-Mech. R. H. N. Prior, R.F.C.

Previously Wounded, now reported Died of Wounds.

17754 2nd Air-Mech. D. W. Imber, R.F.C.

Wounded.

Lieut. J. T. Anglin, Cent. Ontario, attd. R.F.C.
Lieut. C. N. Bennett, Quebec, attd. R.F.C.
2nd Lieut. A. O. Bigg-Wither, R.F.C.
2nd Lieut. H. Blofeld, R.F.C.
2nd Lieut. G. L. Castle, R.F.A., attd. R.F.C.
Capt. N. S. Caudwell, Can. Inf., attd. R.F.C.
Lieut. S. Gavin, Devon and R.F.C.
2nd Lieut. R. R. Gyles, R.F.A., attd. R.F.C.
2nd Lieut. E. W. Hallam, Yeo. and R.F.C.
2nd Lieut. W. A. Hunter, K.O. (Yorks. L.I.), attd. R.F.C.
Capt. A. M. Jones, Aust. F.C.
Lieut. E. C. Kelly, R. Dub. Fus., attd. R.F.C.
2nd Lieut. B. Ord, R.F.C.
2nd Lieut. W. P. Scott, R.F.C.
Lieut. M. J. Trotter, Quebec, attd. R.F.C.
2nd Lieut. R. W. G. West, S. Staffs, and R.F.C.
2nd Lieut. G. M. Wilkinson, Duke of Cornwall L.I., attd. R.F.C.
Lieut. E. A. Worrall, R.F.C.
2nd Lieut. A. M. Wray, The Buffs, attd. R.F.C.

Previously reported Missing, now reported Wounded and Prisoners of War in German hands.

2nd Lieut. A. Fraser, R.F.C.
Lieut. R. A. P. Johns, Hussars, attd. R.F.C.
2nd Lieut. J. Johnstone, R.F.C.

Previously reported Prisoners of War, now reported Wounded and Prisoners of War in German hands.

2nd Lieut. N. L. Knight, R.F.C.
Capt. A. Lees, R.W. Kent, attd. R.F.C.
Lieut. A. D. Whitehead, Royal Warwick., attd. R.F.C.

Wounded and Prisoner of War in Turkish hands.

Lieut. T. E. Lander, M.C., High. L.I., attd. R.F.C.

Missing.

2nd Lieut. F. Barrie, R.F.C.
Lieut. A. S. Bourinot, Quebec, attd. R.F.C.
Lieut. D. R. Cameron, R.F.C.
2nd Lieut. A. S. Carey, R.F.C.
Lieut. H. H. Cotton, Can. Inf., attd. R.F.C.
Lieut. T. N. Dickinson, Ind. Cav., att. R.F.C.
Lieut. S. S. Hume, Yeo. and R.F.C.
Lieut. F. W. Kantel, Can. Art., attd. R.F.C.
2nd Lieut. B. S. Lister, R.F.C.
2nd Lieut. E. A. Lloyd, Yeo. and R.F.C.
Capt. L. W. McArthur, M.C., H.A.C. and R.F.C.
Sec. Lieut. P. C. S. O'Longan, R. Irish, attd. R.F.C.
2nd Lieut. R. U. Phalen, R.F.C.
Lieut. R. M. Roberts, K.O. (York. L.I.), attd. R.F.C.
2nd Lieut. G. M. Robertson, High. L.I. and R.F.C.
Lieut. B. F. Rowe, R. Fus., attd. R.F.C.
Capt. A. De Selincourt, R.F.C.
2nd Lieut. C. F. Smith, King's (L'pool.) and R.F.C.
Lieut. V. Smith, N'land. Fus., attd. R.F.C.
Lieut. T. M. Southorn, R.F.A. and R.F.C.
2nd Lieut. E. H. Stevens, E. Lanc., attd. R.F.C.
Lieut. E. A. Stewardson, Queen's (R.W. Surrey) and R.F.C.
2nd Lieut. H. E. Waters, R.F.C.
42054 2nd Air-Mech. E. W. Barnes, R.F.C.
40213 2nd Air-Mech. V. M. Barrie, R.F.C.
1897 1st Air-Mech. P. Bonner, R.F.C.
65249 2nd Air-Mech. F. Hadlow, R.F.C.
44854 2nd Air-Mech. R. H. Jones, R.F.C.
1908 Corpl. E. Langridge, R.F.C.
65249 2nd Air-Mech. F. Hadlow, R.F.C.
61869 2nd Air-Mech. E. Wood, R.F.C.

Previously reported Missing, now reported Prisoners of War in German hands.

2nd Lieut. E. V. A. Bell, Hamp. and R.F.C.

2nd Lieut. C. B. Boughton, Welsh, attd. R.F.C.
2nd Lieut. G. N. Brockhurst, R.F.C.
2nd Lieut. V. L. A. Burns, R.F.A. and R.F.C.
2nd Lieut. F. C. Craig, R.F.C.
Lieut. H. R. Davies, R.E., attd. R.F.C.
2nd Lieut. J. E. Davies, London and R.F.C.
2nd Lieut. H. Davis, E. Yorks., attd. R.F.C.
Lieut. E. J. Dilnutt, R.F.C.
Lieut. C. E. French, E. Ont., attd. R.F.C.
2nd Lieut. J. S. Heagerty, Buffs (E. Kent), attd. R.F.C.
Lieut. G. E. Hicks, R.F.C.
2nd Lieut. C. W. D. Holmes, Bedford and R.F.C.
2nd Lieut. J. D. V. Holmes, R.F.C.
2nd Lieut. D. L. Houghton, Middlx., attd. R.F.C.
2nd Lieut. F. J. Kirkham, R.F.A., attd. R.F.C.
2nd Lieut. T. H. Lines, R.F.C.
2nd Lieut. R. R. Macintosh, R. Scots, attd. R.F.C.
Lieut. A. H. K. McCallum, Gen. List, attd. R.F.C.
Lieut. A. W. Martin, Yorks and R.F.C.
2nd Lieut. J. R. Middleton, R.F.C.
2nd Lieut. T. S. Millar, R. Scots, attd. R.F.C.
Lieut. H. W. Owen, R.F.C.
2nd Lieut. A. R. M. Rickards, R.F.C.
2nd Lieut. S. Roche, R.F.C.
Lieut. W. O. Russell, R.F.C.
Lieut. D. J. Stewart, York and Lanc., attd. R.F.C.
2nd Lieut. W. T. B. Tasker, R.F.C.
Capt. D. M. Tidmarsh, M.C., R. Irish, attd. R.F.C.
2nd Lieut. J. V. Wischer, R.G.A., attd. R.F.C.
Lieut. A. W. Wood, R.F.C.
Lieut. D. B. Woolley, R.F.C.
2nd Lieut. R. S. L. Worsley, R.F.C.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SPECIAL COMMITTEE MEETING.

A SPECIAL MEETING of The Committee was held on Wednesday, the 13th inst., when there were present :—Col. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Brig.-Gen. W. S. Brancker, R.F.A., Squadron-Commander F. K. McClean, R.N., Mr. J. H. Nicholson, Wing-Commander Alec Ogilvie, R.N., Lieut.-Comdr. H. E. Perrin, R.N.V.R. (in attendance), and the Assistant Secretary.

Club House.

The following prices have been fixed for the present by the Committee :—

Bedroom (including Bath)	5*s.* each per night.
Breakfast	2*s.* 6*d.*
House Luncheon	2*s.* 6*d.*
House Dinner	3*s.* 6*d.*

Billiard Room.

The Billiard Room is now open for the use of the Members.

THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

Subscriptions.

	£	s.	d.
Total subscriptions received to June 5th, 1917	11,813	19	9
G. H. Mansfield, Managing Director of the Aircraft Supplies Co., Ltd., 17, John Street, Theobald's Road, W.C.; Proceeds of the sale of copies of "Standard A.G.S. Parts for Aircraft," by Bernard Isaac (Second contribution, making a total of £9 7*s.* 6*d.*)	3	2	6
Staff and Workers of Gwynnes, Ltd. (Fortieth contribution)	9	14	4
Total, June 13th, 1917	11,826	16	7

B. STEVENSON, Assistant Secretary.
3, Clifford Street, New Bond Street, W. 1.

"X" AIRCRAFT RAIDS.

IN view of the decision of the Government not to allow details of places visited by enemy aircraft to be published, we are, as before, giving to each one an index number. Eventually, when details are available, we shall give the respective information under these index numbers, which will facilitate easy reference to each particular raid.

"X 62" Raid (June 5th).

THE following *communiqué* was issued by the Field-Marshal, Commanding-in-Chief, Home Forces, on June 6th :—

"Full police reports which have now been received show that the total casualties in yesterday's air raid were as follows :—Killed, 12; injured, 36. The material damage was not great."

The Secretary of the Admiralty issued the following announcement on June 6th :—

"Yesterday afternoon (June 5th), at 5.30, four Royal Naval Air Service pilots on patrol off Dunkirk observed about 18 enemy aircraft off Ostend, well out to sea, proceeding in a north-westerly direction. Indecisive engagements took place, and the enemy were chased to England.

"On their return journey the enemy were pursued and engaged by a naval machine from an air station on the Kentish coast. Two enemy aircraft were in turn attacked and driven down by this pilot, who then landed at Dunkirk. Other engagements between Royal Naval Air Service machines from home stations and the enemy also took place over the Thames estuary. Later, 10 naval pilots from Dunkirk encountered 16 hostile aircraft off Ostend returning from their raid on England, and numerous fights took place. Two of these hostile aircraft were completely destroyed, and four others driven down out of control, of which two are considered also to have been destroyed. All our machines returned safely."

German Version.

Berlin, June 6th.

"One of our aeroplane squadrons dropped over 5,000 kilogrammes (nearly 5 tons) of bombs on the military establishments of Sheerness (mouth of the Thames). Good hits were observed."

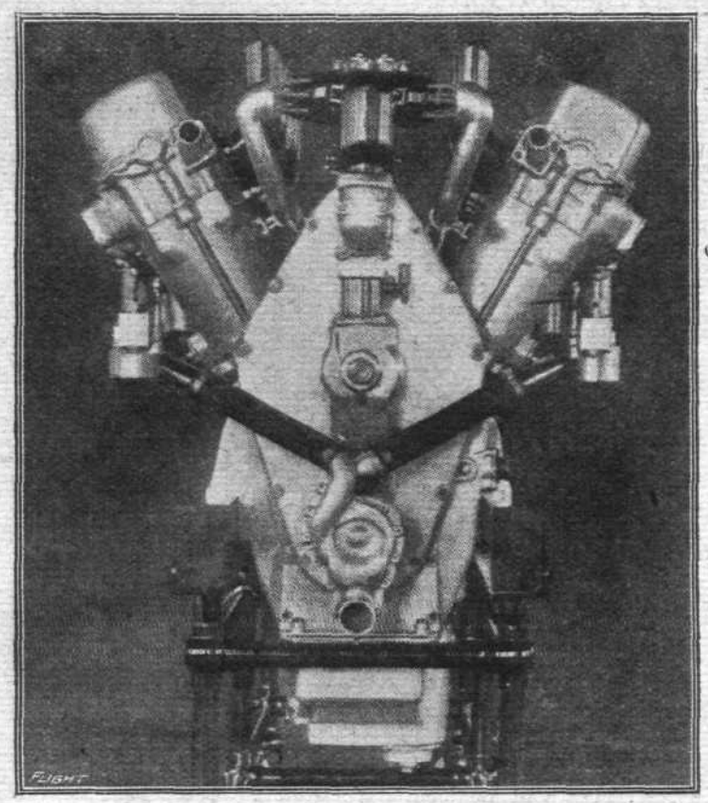
"X 63" Raid (June 13th).

THE following *communiqué* was issued by the Field-Marshal Commanding-in-Chief on June 13th :—

"About .15 hostile aeroplanes were heard crossing the Essex coast, passing in the vicinity of the Nore, about 11 a.m. to-day. They proceeded in the direction of London, separating when they had covered half the distance. The East End of London has been attacked and bombed, but no reports have yet been received of casualties or damage done. The anti-aircraft guns of the London defences have been in action, and a large number of aeroplanes are still up in pursuit."

U.S. NAVY TEST OF 300 H.P. KNOX AERO ENGINE.

THE following extracts from the official report on the U.S. Navy tests of the 300 h.p. Knox aero engine should be of interest. The tests, which were passed successfully by the engine, consisted of :—(1) A run for determining the points of a horse power-revolution per minute curve. (2) A run



End view of the 300 h.p. Knox engine.

of six hours at rated load and speed. (3) Engine entirely disassembled, inspected and measured, and then reassembled. (4) A further run of 1 hour after reassembling. The tests were carried out in the research laboratory of the Knox Motors Co. of Springfield, Mass.

The engine is a 12-cylinder water-cooled V of 4¾-in. bore by 7 in. stroke, with gear reduction drive to the propeller, and fully equipped with electric starter, two-cycle air pump for petrol feed, &c. The total weight of the engine is 1,430 lbs., 47 per cent. of which weight is accounted for by a special aluminium alloy.

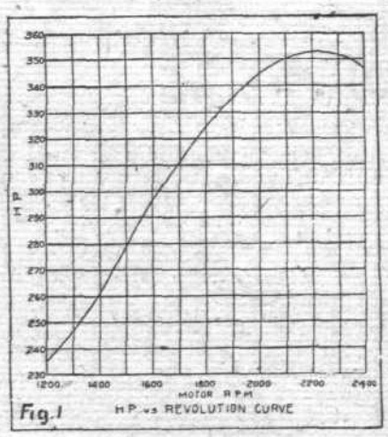
In the first test the following readings were obtained, from which the curve shown in Fig. 1 was plotted :—

Motor R.P.M.	Propeller R.P.M.	H.P.	Torque Ft. Lbs.
1217	730	235	1685
1350	810	255·5	1655
1605	960	308	1715
1797	1086	322	1565
2039	1224	347	1485
2247	1340	353	1375
2390	1428	346·5	1265

The readings obtained during the six-hour run were as follows :—

Time H.M.	Motor R.P.M.	H.P.	Oil Pressure	Water Inlet	Temperature Outlet
00	1807	307	75	106	137
15	1820	309·5	70	102	136
30	1824	310	60	104	138
45	1815	309	60	104	138
1:00	1807	307	60	110	146
1:15	1794	305	60	106	140
1:30	1810	307·5	60	106	140
1:45	1831	311·5	60	88	129
2:00	1786	303·5	62	100	135
2:15	1793	305	68	103	137
2:30	1789	304	64	64	124
2:45	1809	307·5	62	91	133
3:00	1795	305	61	98	137
3:15	1840	312·5	60	96	134
3:30	1811	308	61	92	134
3:45	1864	317	62	100	134
4:00	1815	306·5	61	100	134
4:15	1814	308·5	62	102	136
4:30	1829	237	65	100	136
4:45	1810	287	65	100	136
5:00	1890	306·5	61	103	134
5:15	1869	304·5	60	101	135
5:30	1845	307	61	98	134
5:45	1838	304	60	98	134
6:00	1892	315	60	94	134
Average	1835	304·28	62·96	99·52	135·48

After the six-hour run the engine was disassembled and the various parts measured and examined. One exhaust



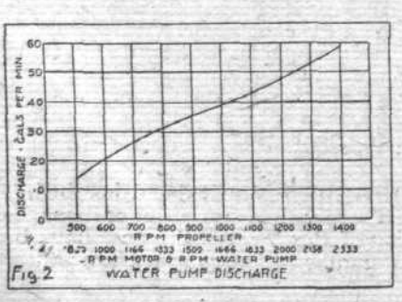
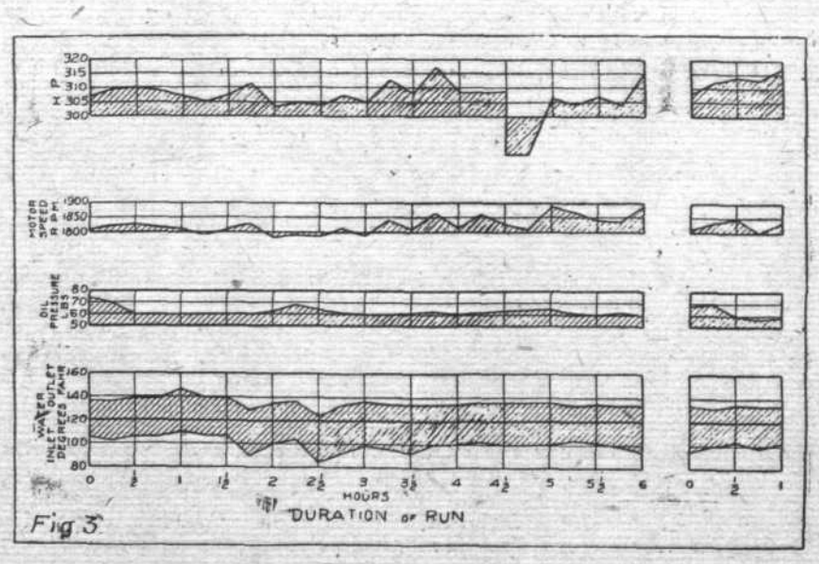


Fig. 1.—The h.p.–r.p.m. curve of the 300 h.p. Knox aero engine.

Fig. 2.—Curve of water pump discharge.

Fig. 3.—Performance curves of the 6- and 1-hour tests.



valve, which showed slight pitting in the seat was the only part replaced. No other parts required any re-adjustment, and both main and connecting rod bearings showed not the slightest sign of wear. The same was the case with the gudgeon pins, pistons and cylinders. The engine was then reassembled and run for one hour, during which the readings below were taken.

During the hour run 32 gallons or 199 lbs. of fuel were used, making a fuel consumption of ·5715 lbs. horse-power per hour. The oil consumption was ·0435 lbs. horse-power per hour.

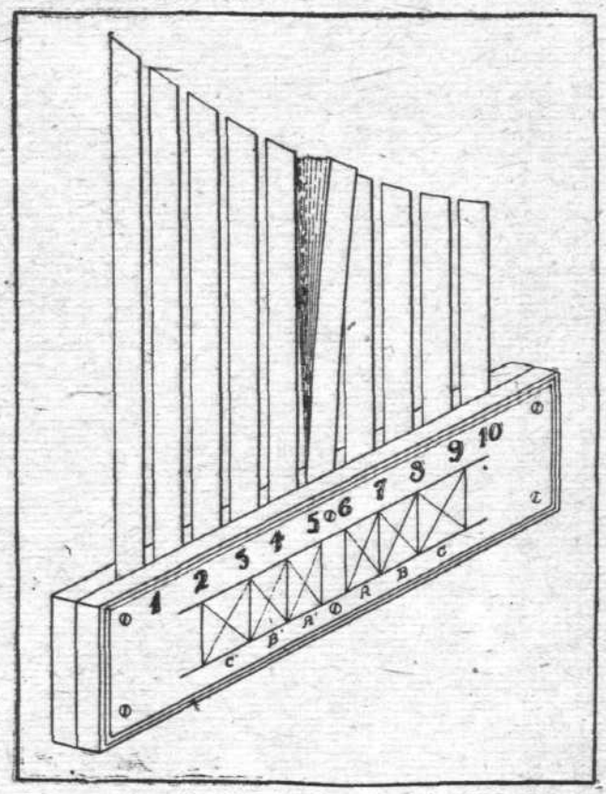
Time H.M.	Engine R.P.M.	H.P.	Oil Pressure	Water Inlet.	Water Outlet.
0	1811	308	68	94	134
15	1835	312	69	99	132
30	1848	314	60	103	135
45	1801	313	57	98	134
1 0	1835	317	58	102	134
Average	1826	312·8	60·4	99·2	134

A VIBRATION TYPE TENSION METER.

IN the course of "tuning up" an aeroplane it is not always an easy matter to judge of the tension in each bracing wire. Twanging the wires certainly gives some sort of an indication of the tension, but the accuracy obtainable in this manner is necessarily small. Nor is it possible, without the employment of some standard of comparison, to attain any uniformity, since no two men will tune identical machines alike. We have even heard of an official, probably of a musical turn of mind, who insisted on having a machine so tuned up that two wires, anchored to the same strut socket but being of different lengths, emitted exactly the same note when twanged. Instruments have, we believe, been employed in which a slight sideways displacement of a short length of the wire served as a measure of the tension in the wire. The phenomenon of vibratory resonance has already been utilised for certain types of frequency meters, for speed indicators of electric motors, &c., but so far as we are aware, the first to suggest and actually employ the same principle for measuring the tension in the bracing wires of an aeroplane is Signor C. M. Lerici, engineer to the Societe S.I.A. (F.I.A.T.), of Turin, Italy.

The Lerici vibration type tension meter, illustrated in the accompanying diagram, consists of a series of small leaf springs of steel, secured to a base at one end, and free at the other. The length of each spring is proportioned to its proper period of vibration. When the base of the tension meter is placed lightly on a bracing wire that has previously been caused to vibrate, for instance by twanging, the spring whose period approaches most closely to that of the wire will show a very sensible vibratory movement. Signor Lerici points out that for a given wire subjected to a tension T, the frequency of vibration being n, one may write the equation $T = kn^2$. The vibration type tensionmeter gives directly the value of n, and as k is constant for a given wire, the meter gives in fact a measure of the tension T.

The number of leaf springs, or in other words the length of the instrument, will, of course, depend on the number of different lengths of bracing wires to be tested, but Signor Lerici informs us that he has found by experience that for all modern biplanes, including the most recent types of 1917, a series comprising springs of 20 to 60 vibrations per second is sufficient, since it covers the range met with in these machines. During some destruction tests on new types of aeroplanes it has been found possible to follow from the start of the tests the distribution of tension in all the bracing wires, and to detect every irregularity which the calculations had not foreseen. Signor Lerici has also been able to individuate all the members (struts and bracing wires) which were influenced during flight by the vibrations of the motor, the fundamental vibration of which has a frequency of 22 to 25 per second (1,300 to 1,500 r.p.m.). With regard to the effect of the presence of wire strainers, it was found that the error due to these was in the neighbourhood of 5 per cent.



Diagrammatic sketch of the Lerici vibration type tensionmeter for aeroplanes.

Standardisation of Copper Tubes for Aircraft.

IT is officially announced by the Air Board that difficulties having been experienced by aircraft contractors in obtaining supplies of copper tubing, the causes were investigated, and they were found to be—(1) the great variety of sizes called for; and (2) the fact that tube makers received orders very irregularly and for small quantities. Arising out of the investigation, the Specification Committee of the Air Board has decided that, in future, copper tube for aircraft contracts will be specified in terms of external diameter and legal standard wire gauge. As far as possible tubes of 20 Gauge (.036-in.) will be used, to the exclusion of all other thicknesses. Where, for special considerations, it is desirable to use other thicknesses, the choice will, as far as possible, be restricted to Gauges 16, 18 and 22. The last named is difficult to manufacture, and will be avoided as far as possible.

A new Air Board Specification for copper tube will shortly be issued, and will have as an appendix the following list of sizes and gauges which the Air Board regard as standard :—

20 *Gauge*.—$\frac{3}{16}$-in., $\frac{1}{4}$-in., $\frac{5}{16}$-in., $\frac{3}{8}$-in., $\frac{7}{16}$-in., $\frac{1}{2}$-in., $\frac{5}{8}$-in., $\frac{3}{4}$-in., $\frac{7}{8}$-in., 1-in., $1\frac{1}{8}$-in., $1\frac{1}{4}$-in., $1\frac{3}{8}$-in., $1\frac{1}{2}$-in., $1\frac{5}{8}$-in., $1\frac{3}{4}$-in., 2-in.

18 *Gauge*.—1-in., $1\frac{1}{4}$-in., $1\frac{1}{2}$-in., $1\frac{3}{4}$-in., 2-in.

16 *Gauge*.—$\frac{1}{2}$-in., $\frac{5}{8}$-in., $\frac{3}{4}$-in., $\frac{7}{8}$-in., 1-in., $1\frac{1}{4}$-in., $1\frac{1}{2}$-in., $1\frac{3}{4}$-in., 2-in., $2\frac{1}{2}$-in.

22 *Gauge*.—1-in., $1\frac{1}{8}$-in., $1\frac{1}{4}$-in., $1\frac{3}{8}$-in., $1\frac{1}{2}$-in., $1\frac{3}{4}$-in., 2-in.

Zeppelin Activity.

REPORTS from Copenhagen state that on June 7th two Zeppelins were observed off Klitmoeller, on the west coast of Jutland, going southwards. At 3 o'clock the following morning a heavy cannonade was heard lasting for an hour and a half. After the cannonade was over a Zeppelin was observed very far from land following a north-westerly course.

From Ameland, via Amsterdam, it is reported that some patrol vessels, accompanied by two seaplanes, passed the island on the morning of June 11.

The *Handelsblad* learns from Vlieland that a Zeppelin passed by on June 10th, coming from the west, and disappeared in a northerly direction. Later, another Zeppelin was observed, while at the same time a squadron of war vessels was sighted steaming eastwards.

AIRISMS FROM THE FOUR WINDS

A SPECIAL *matinee* will be given next Tuesday, June 19th, at 2.30, at Wyndham's Theatre, which has been very kindly lent by Mr. Gerald du Maurier and Mr. Frank Curzon, for comforts for the Royal Flying Corps in the Near East. Several distinguished artists are giving their services in this good cause.

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ANY remaining doubt as to the fate of Capt. A. Ball, V.C., D.S.O., M.C., disappeared when his name was included in the casualty list on June 11th among the officers previously reported missing, and then stated to have fallen in action.

FROM the *Daily Chronicle* "Office Window":—

"The newsboy has discovered apparently an infallible seller. His raucous shout of 'Winner!' has been supplanted by something with 'Air Raid' in it. There is always an air raid somewhere. On Saturday one newsboy was selling his papers fast and furiously. 'Air Raid on Kent' was what seemed to catch the ear. Seemed! It was simply 'Ghent,' as Browning rhymed it, that was drawing the people's ha'pence."

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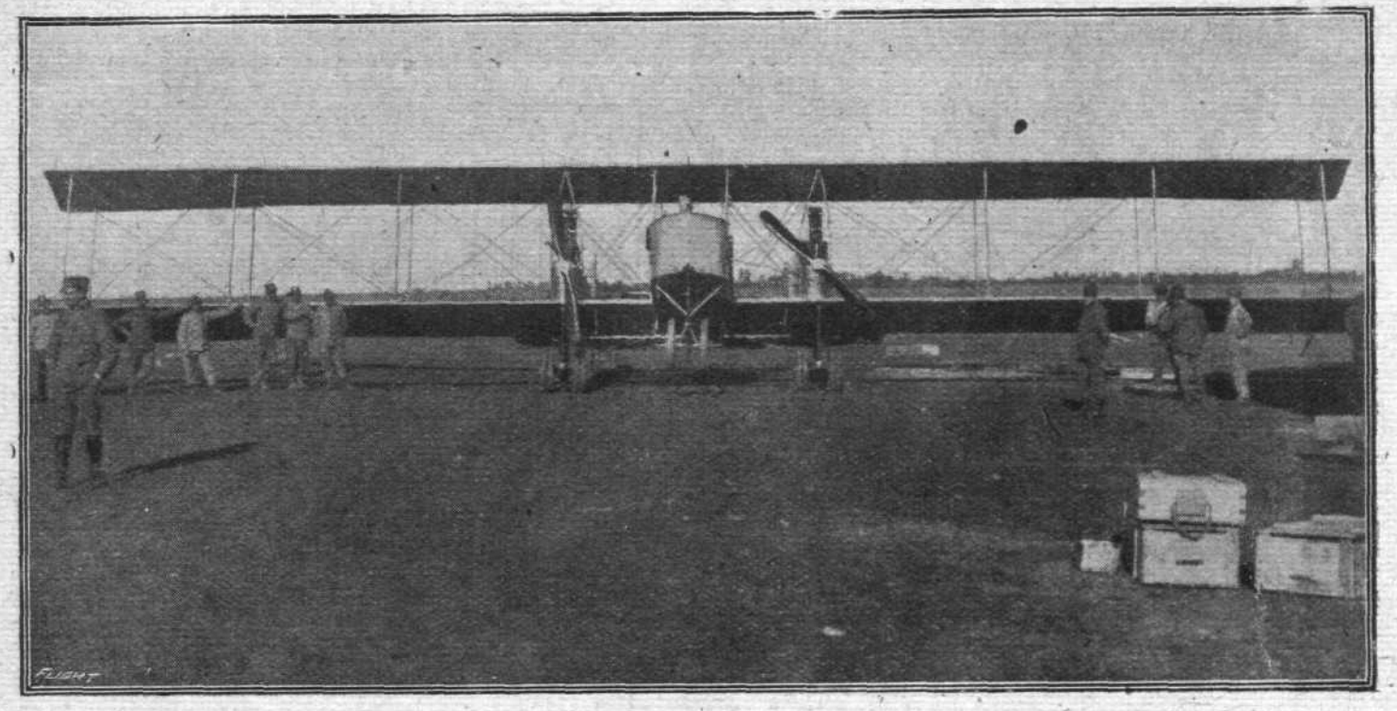
MR. JOYNSON HICKS, Chairman of the Parliamentary Air Committee, who has been over with Sir Charles Nicholson



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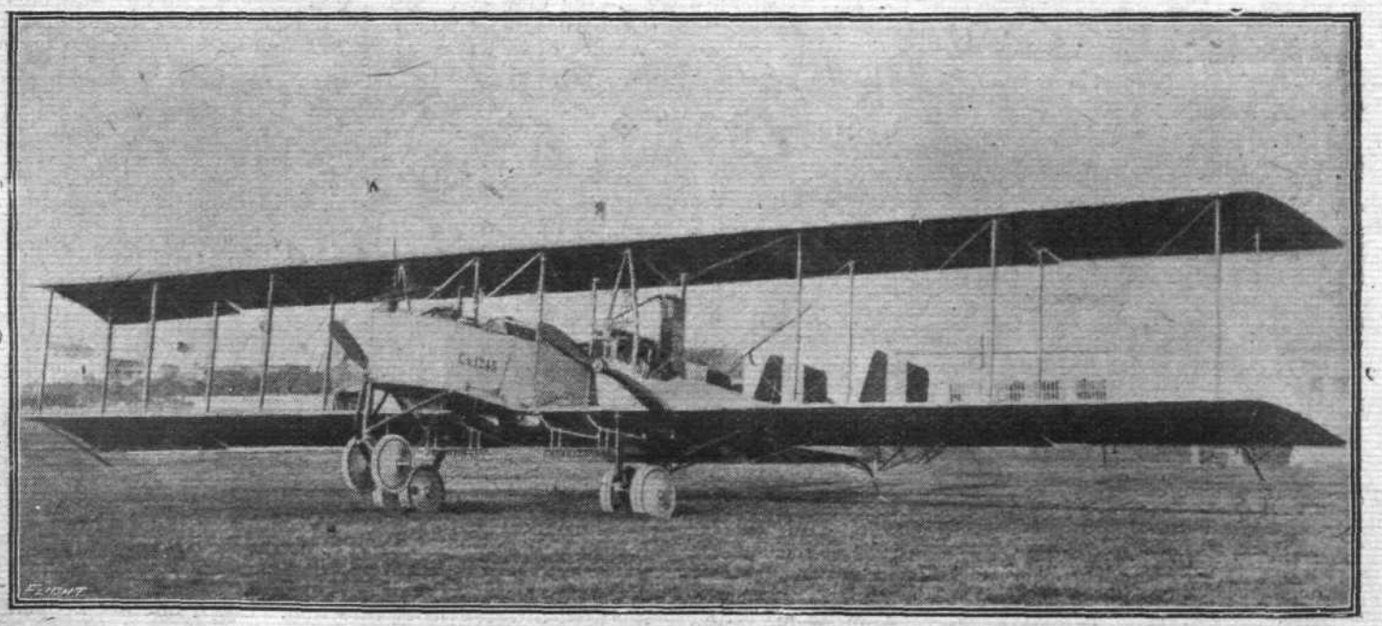
FROM "THE WAR IN ITALY."—Caproni machine for bomb-dropping.



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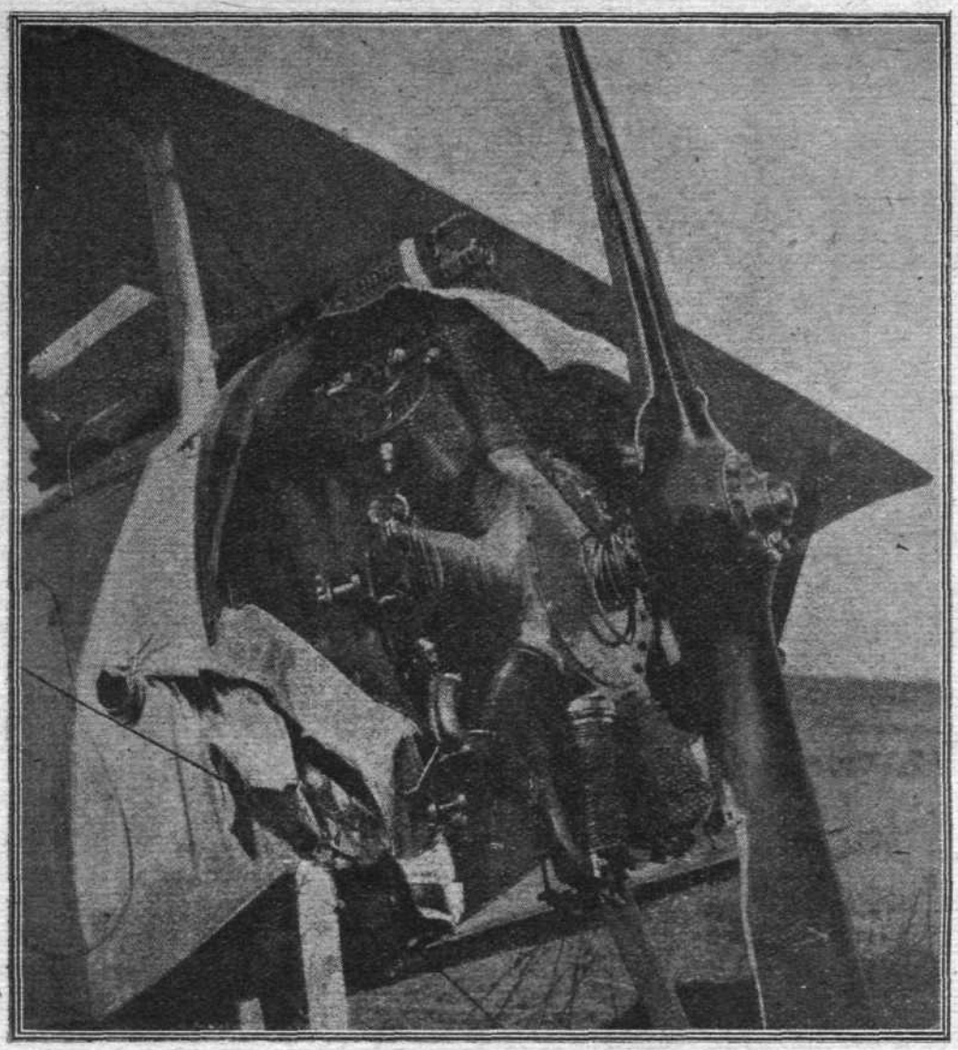
FROM "THE WAR IN ITALY."—A three-quarter front view of a Caproni machine for bomb-dropping.



From "La Guerre Aérienne."

Aeroplane *versus* anchor cable.—Returning from a flight on his Nieuport, Sergt. Courtois, who had had his propeller damaged by bullets, was making for home against the sun. This accounted for the fact that he failed to see the anchor cable of a French kite balloon. As luck would have it, it was the propeller which struck the cable, otherwise the issue might have been serious. As it was, the Nieuport seemed to hesitate an instant, then, as the cable parted, it resumed its flight. On landing it was found that some ten yards of cable was twisted round the propeller shaft, otherwise no damage had been done. The observer in the kite balloon managed to land safely at Eure-et-Loir.

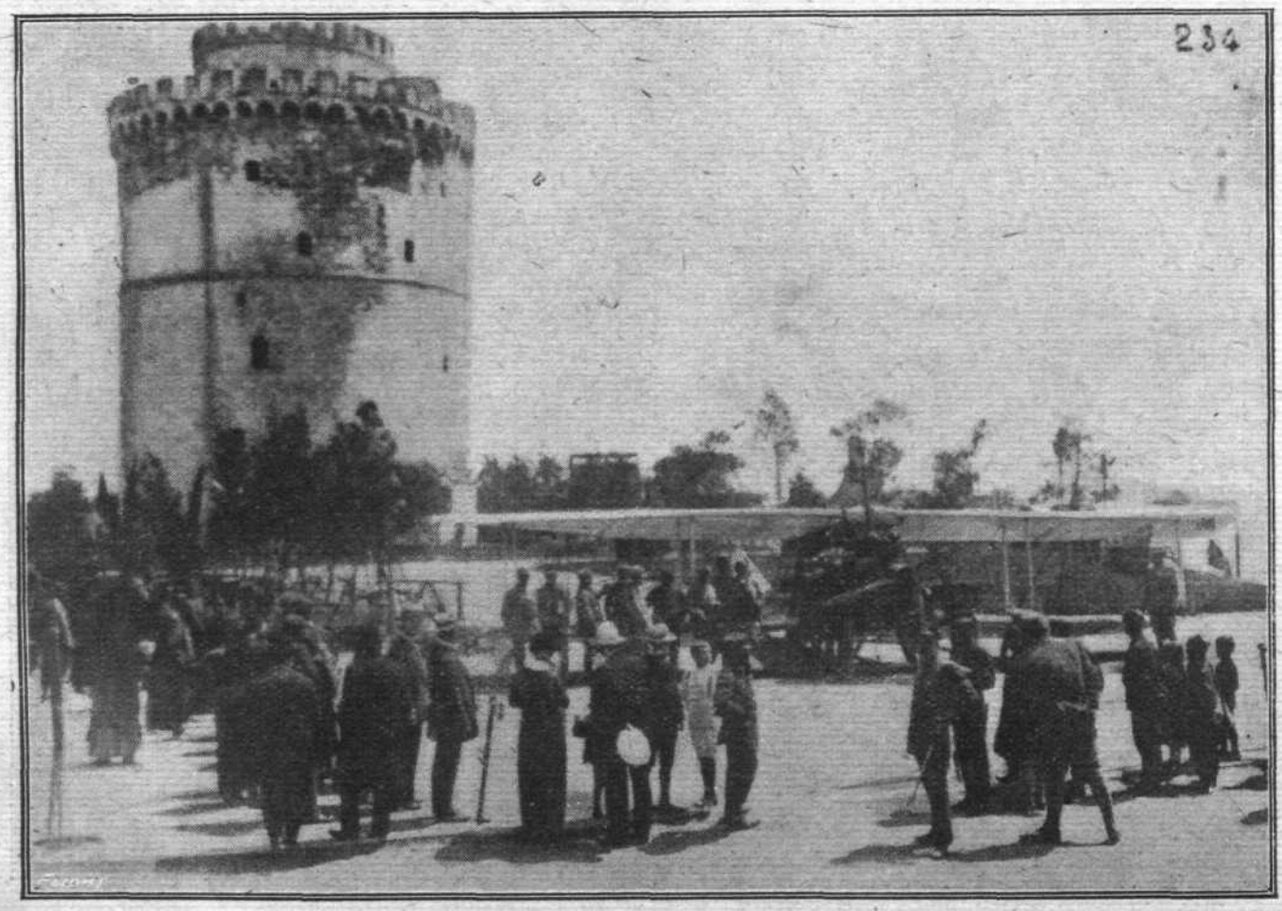
A MUCH-STRAFED ALLIES' MACHINE AT THE NEAR EASTERN FRONT.—A "souvenir" from S. Lieut. Louis Noel.

Reproduced by special permission of the Italian Government.

FROM "THE WAR IN ITALY."—An Austrian Aviatic captured by the Italians.

to France for an extended visit to the R.F.C., is likely, after his experience, to tone down some of his more sweeping attacks upon the state of things in the Flying Services. Nothing like a little personal experience in these matters, and since his joining up with the Commercial Committee upon Aeronautics he will, no doubt, have better opportunities of obtaining a view of affairs in proper proportion. His confidential report to the Air Board upon his experience should be interesting.

THAT September Aircraft Festival Garden Party which will be largely in the making in the hands of Mr. J. A. Whitehead is not likely to miss fire for want of forethought. Already many of the main attractions have been thought out and are "in rehearsal," and a preliminary canter early next week around the grounds of Handworth Park Aerodrome should give an idea of the facilities which exist for making this Festival one worthy of the cause in which it will be held.



A captured German machine on view at Salonica.

MR. WHITEHEAD, by the bye, is no pessimist as to the future of commercial aviation. He goes so far as to prophesy for after the war an air service from London to New York every night, and daily flights from London to Petrograd at £25 per head, the journey taking 15 hours.

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ALTHOUGH experience may modify some of the peeps into the future of commercial aeronautics, as seen by Mr. Holt Thomas, in principle, we have not a shadow of doubt but that he is well within the mark. What one has to remember is that the whole of the work will not be done from this side. Our present Allies will co-operate in no laggard way. By way of a reminder of this no inconsiderable factor toward success, following the report in "FLIGHT" of Mr. Thomas's lecture, a characteristic telegram from Mr. Lorenzo Santoni came to hand last week. Cabling from Milan, Mr. Santoni says :—

"Congratulations for splendid conference Holt Thomas. I have worked all along here, same object, and have registered and started on May 30th the first industrial company for aerial transport, 'Società Transporti Aerei Internazionali,' under chairmanship of the Mayor of ancient Rome, mother of civilisation, Principe Don Prospero Colonna, with close participation of the leading financial, political, industrial and social world of Italy. Italian company will be pleased to collaborate with English friends in noble enterprise, aerial linking of Allies."

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HERE'S a hand of welcome held out for those who take up the scheme this side, to grasp, with others to follow. Italy is already well ahead in establishing a regular service, and the prospects of this company open out direct communication for passengers and parcels in Italy, Sicily, Sardinia, Corsica, the Riviera, Egypt, Tunis, Barcelona, Albania, the Ægean Isles, and later Trieste, Dalmatia, Istria and Asia Minor.

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"THE WAR IN ITALY" is the title of a really gorgeous pictorial publication which is being issued in monthly volumes at 3s. each by the Italian General Headquarters Department. Each issue is crammed full of photographs associated directly with the war, of most live interest, many of the pictures being, apart from their value as a record of facts, works of art. Volume VI deals exclusively with aeronautics, and the series of pictures is worthy of minute study. Beyond an index to the plates, the letterpress is reduced to the smallest possible limits, each photograph telling its own story. By special permission of the Italian authorities we have been permitted to reproduce a few of the plates appearing in this volume, but unfortunately, owing to the present state of the paper trade, these must be regarded as very far short of doing justice to the originals. Even these prints, however, convey interesting subjects for thought, and those who may wish to secure copies of the publication, the head agency is at 1, Old Broad Street, E.C., and the West End agency, 12, Waterloo Place. There will be some further reproductions in the pages of "FLIGHT" beyond those in this week from this work.

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THE Woolf Bureau thinks it well to re-assure the German public as to the destruction from the air of their growing fields of corn. A very nervy state exists amongst the Huns, nevertheless as to the outcome of the "reprisals" in this direction. The Woolf Bureau is inspired as follows :—

"This year, as last year, the rumour has arisen that our enemies intend during the summer months to undertake air attacks on the largest scale against all parts of Germany, in order to destroy by incendiary bombs the ripening corn. It has been proved that the rumour comes from the camp of our enemies, and its sole object is to arouse uneasiness in the German people. There is not the slightest cause for such uneasiness. It is impossible for bombs from aeroplanes to set on fire the ripening fields of corn. We only wish that our enemies would make such hopeless attempts. They would suffer heavy losses in aeroplanes, without being able to do our corn any harm."

TEN YEARS AGO.

Excerpts from the "Auto." ("FLIGHT's precursor and sister journal) of June, 1907. "FLIGHT" was founded in 1908.

EXPERIMENTS IN ITALY.

Experiments are about to be carried out in Italy, under the direction of the Minister of War, with an aeroplane of the Chanute type, which is being constructed at Rome by Messrs. Voisins, of Billancourt. At first gliding only will be attempted, for the machine will not be fitted with an engine.

MR. WELLMAN TO MAKE ANOTHER ATTEMPT ON THE POLE.

That undaunted pioneer of a forlorn hope, Mr. Walter Wellman, is once more assembling his forces at Spitzbergen for another expedition to the North Pole, for which a start will probably be made between July 20th and August 10th. Mr. Wellman has his plans for reaching the Pole all very nicely cut and dried, and, assuming that the conditions turn out to be as he expects them, there is no reason why that very entertaining series of cinematograph illustrations shown in London about a year ago should not represent certain phases of his journey. During the interval that has elapsed since then, a new airship of much larger dimensions than the one previously built has been constructed. The gas vessel of this new monster measures 184 ft. long, is 52 ft. across its greatest diameter, carries 265,000 cubic ft. of gas, and has a total lifting force of 19,500 lbs. The car is suspended close under the balloon, and consists of a framework of steel tubing 150 ft. long and 8 ft. broad. There is an enormous tank beneath the deck of the vessel which has a capacity for holding 1,200 gals. of petrol. At the stern is a rudder 900 sq. ft. in area, constructed on the principle of a bicycle wheel, so that its weight is only 30 lbs. Propulsion is to be effected by a 70 h.p. De Dietrich engine, driving a twin-bladed propeller of 11 ft. in diameter at 380 r.p.m. It appears to be Mr. Wellman's intention to "guide-rope" the entire distance, and with a stroke of genius worthy of the inventor, Mr. Wellman has constructed a kind of leather tail for this purpose, 130 ft. long and 15 ins. in diameter, which is to be packed with 1,200 lbs. of reserve food. Sanguine anticipations place the duration of the trip at from ten to twenty days.

DR. GRAHAM BELL'S AEROPLANE.

Will the genius that put together a coil, a magneto, and a metal plate, and caused them to transmit sounds and words across miles upon miles of connecting wire, be able, after all, to fathom the great mystery of aerial navigation? That is the question which is revived by a further report of the progress being made by Dr. Graham Bell, the telephone inventor, in his investigation of the riddle of aerial navigation. When Dr. Bell first began his experiments in this direction we recorded the fact that he had entered the arena of practical aeroplaning, and now comes a Reuter message from Nova Scotia stating that Dr. Bell is confident that he will demonstrate this summer the navigability of his flying machine.

THE WRIGHT BROTHERS IN EUROPE.

The famous aeronauts, Wilbur and Orville Wright, have at last left their far Western home for a trip to Germany (it is stated on business bent), and took in Paris on their way this week, where they spent part of their spare time on a visit to the Antoinette engine and other works. Now that they have got thus far, we hope that they may see their way to accepting the long-standing invitation of our own Aero Club, and that before the summer is out they may be induced to visit England and give British aeronauts a first-hand account of their experiments.

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Sir Douglas Haig's Tribute to the Flying Services.

IN his dispatch of June 8th describing the taking of the Messines Ridge, Field Marshal Sir Douglas Haig says :—

"Following on the great care and thoroughness in the preparations made under the orders of General Sir Herbert Plumer, the complete success gained may be ascribed chiefly to the destruction caused by our mines, to the violence and accuracy of our bombardment, to the very fine work of the R.F.C., and to the incomparable dash and courage of the infantry. The whole force acted with perfect combination.

"Excellent work was done by the Tanks, and every means fo offence at our disposal was made use of, so that every arm and service had a share in the victory.

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The Secretary of the Admiralty issued the following statement on June 11th :—

"In connection with the recent offensive ons the Western front, an expression of thanks has been received from the Army Council for the services rendered by the Naval Air Squadrons at present with the Expeditionary Force. The Army Council endorses Field-Marshal Sir Douglas Haig's appreciation, which he expressed as follows :—

"'The pilots have shown energy, gallantry, and initiative, and have proved themselves capable of standing hard work and hard fighting. Further, the machines with which they are provided have undoubtedly helped largely towards the success of the aerial fighting which has taken place this spring on the front of the British Armies in France.'"

A FURTHER THREE YEARS' FLYING EXPERIENCE.*

By Captain B. C. HUCKS.

THE past three years, although normally a short space of time, yet measured by the advance of aviation, has been a veritable lifetime.

I think I am right in saying that through the war aviation has advanced more than it would have done in eight or ten years of peace conditions. In fact, the rate of improvement in aircraft is so fast, the pace so alarmingly rapid, that it is almost impossible for manufacturers to keep pace, for it seems that by the time the latest and most efficient type of machine is manufactured in sufficiently large numbers to gratify half the requirements of the Services, that type is out of date and obsolete.

A pilot has only to take a short flight on a 1914-type machine and then fly the latest 1917 pattern as a comparison to really appreciate this colossal advance.

Some little time ago I had occasion to again fly, after a considerable lapse of time, a 50 h.p. Gnome-Blériot, a one time premier machine—in fact, a type used quite a lot by ourselves and the French at the very beginning of the war. At first I believed the machine to be a very bad specimen of the species, but ultimately, after flying it for some time and acquiring a sort of lost art of balance, like a skater who has not skated on ice for years and has to get his legs again, I realised that it was quite a good specimen of the type, but that it takes quite a time to again get used to such inefficiency. The advance seems to have been along, one might say, quite conventional lines, that is, improvements on what might be accepted as standard designs, and no good results have been obtained from any departure from that standard. Perhaps the furthermost departure from what I call standard—and that is very slight—has been the triplane. The results obtained with the quadroplane have not justified the experiment.

During the past three years the first marked improvement, to my mind, which asserted itself was the inherently stable machine, attained apparently by such slight detail alterations as sections of planes and elevators that it required an experienced eye to detect a stable or unstable aeroplane by casual inspection when standing together. Then came the synchronised timing gun-gear, which enabled the machine guns to be fired through the propeller on tractor machines. This device is really so simple that one is at a loss to understand why it had remained so long undiscovered. It had the effect of giving the tractor type of machine a new lease of life. Although a more efficient type aerodynamically than the pusher, it had been falling into disfavour as a fighter on account of the inability of the pilot to shoot straight ahead of the machine. Improvements in engines, to my mind, are responsible for present-day performances to a far greater extent than improvements in machines, chiefly through sheer increase of horse-power, as my diagram shows. And cases have occurred where certain obsolete types have been made serviceable simply by fitting an improved type of engine. The improvements in the machines themselves seem to have been limited to details such as wing sections, attention to head resistance, soundness of construction, &c. The very efficient freak machine has yet to make its appearance. I will not attempt to discuss the future of aviation, but setting aside the boundless commercial possibilities, I am more and more convinced that if we find it necessary to keep up an enormous Navy, say, a two-Power standard, to protect our island, it will be essential to maintain at least the same standard in the air. That in itself guarantees a colossal future for aeronautics.

Difference in Machines.

I have flown many different types of aeroplanes, and, considering the extraordinary variations in the types, the difference in the actual piloting of any modern machine, to my mind, is remarkably small. I am of the opinion that a pilot who is thoroughly efficient with any particular type will, in a very short time, be master of any. I find that on stepping out of a very fast small scout into a really big twin-engine machine the difference in the manner of piloting is very slight compared with the vast difference in the machines. Precisely the same methods are employed, the same trouble and risks are to be avoided. The chief characteristics seem to be that the smaller and faster machines are more difficult to land, but are easier to handle in the air. In the case of "crashes," the larger and heavier the aeroplane the less damage there is likely to occur to the occupants, as a tremendous amount of the impact is absorbed by the machine. Very much larger and heavier machines than those at present in use might be comfortably flown single-handed, no extra effort being required for the controls, provided the controlling surfaces are properly balanced.

To the lay mind it might appear that with such contrasts in the outward appearance of the smaller and larger machines, that it would be necessary to train pilots specially and extensively for each type, but in my experience this is not so. I certainly think the best results are obtained when pilots are allowed to specialise. This, however, I understand has many drawbacks on active service.

Crashes.

Crashes are mainly due to three causes, viz., engine failure, faulty piloting and faulty machines. Engine failure undoubtedly is responsible for most of the crashes, often because of the hopeless unsuitability of the landing ground at the pilot's disposal. To many pilots engine failure is most disconcerting, and it is then they are called upon to use rather more judgment and skill, so that even with a fairly suitable landing ground available they very often crash. In my experience, embracing the testing of hundreds of new machines, it is seldom that a serious defect in the engine "lets one down"; it is nearly always due to a small detail. I think I have had to make more forced landings through failure of the petrol supply than all the other troubles combined. This is due more often to failure of the pressure feed than to a choke in the supply pipes, and very seldom to severed connections in the feed system.

Because of the absence of a float chamber to the carburettor in the rotary engine, even a variation of the petrol pressure is more serious than in the rigid stationary type. In the former case the amount of petrol that gets to the motor is controlled by the pressure and a fine adjustment. If the pressure increases unduly the motor chokes from over richness of mixture; on the other hand, if the pressure drops away the mixture is unduly weakened. This variation can be controlled by the fine adjustment to a large extent, but when that limit is exceeded the engine will fail. Most of the trouble seems to be caused by failure of the pump, which in some cases forms an integral part of and is driven by the motor; in others it is a separate unit, driven by a small air-screw. These failures are usually through valves sticking up and pistons becoming dry. Other causes of failure are in the relief valve not being pressure tight or sticking down. At any rate, the present system of pressure feed, to my mind, is such a bugbear that it is high time something was substituted. As far as the non-rotary motor is concerned, to my knowledge this matter is being tackled. I have been flying recently a machine fitted with a petrol pump in place of the air pressure pump, the petrol being pumped direct from the main tank to the carburettors, and the surplus is returned to the tank through an adjustable spring-loaded relief valve, so that petrol is delivered at any desired pressure to the engine. So far it has proved most satisfactory, with this advantage, that a punctured tank does not put it out of action. Dirt in the petrol tank accounts for quite a large proportion of engine failures in new machines. This form of trouble ought to be avoided. It is an important matter which manufacturers should be made to recognise, and a very thorough system of tank washing employed before installation in the machines. The dirt in the tank usually takes some time to work its way into and accumulate in the feed pipes or filters sufficiently to choke them. The machines are often by that time being delivered by air by pilots who are none too familiar with them, consequently engine failure means a good chance of crashing.

I remember having four forced landings while delivering a new B.E.2c from Farnborough to Dover on this account. Another simple cause of engine failure which might easily be guarded against is that petrol cocks in many cases have no definite locking device to ensure that they remain in the open position during flight, consequently they are liable to vibrate into the "off" position, thus cutting off suddenly the petrol supply. Many instances have come to my notice where petrol cocks are fitted in such a manner that the tendency is, through the weight of the cock lever, to fall shut instead of the reverse. This is such a simple and yet such an important point, that it really is surprising mistakes like this are continually allowed to be made. I have had engines cut out suddenly on three occasions during the past two months from this cause alone—one meant a forced landing because the petrol cock was not accessible to the pilot, the other two were opened again in the air. It often leads to serious results, as the petrol fails suddenly, and it is seldom that the

* A Paper read before the Aeronautical Society on Wednesday, June 6th, 1917.

cause is discovered before the forced landing is made. Having somewhat a limited time at my disposal this evening, I will not touch on what I have found to be other causes of engine failures, but I can assure you that as far as my experience shows they are a small proportion compared with those due to petrol supply, and improvements in this direction will reduce engine failures enormously.

Errors of judgment or faulty piloting account for nearly, or perhaps as many, crashes as engine failure. The most common error made even by experienced pilots is losing flying speed on a turn which starts a side-slip, and, given sufficient height, terminates in a nose dive, or the more serious predicament, a spin. This mistake is often made under the stress of circumstances when engine failure calls forth extra effort on the part of the pilot to reach a certain landing spot. The trouble is nearly always incurred by turning too flatly until the wing drops and the machine side-slips, generally in the effort to get into more suitable ground than that available straight ahead. This is always a dangerous manœuvre, and in nine cases out of ten when smashes have resulted probably less damage would have been caused had the pilot kept his machine from turning and pancaked straight ahead. I have found that most of the later type machines can be stalled (*i.e.*, speed reduced well below flying speed) without any risk of side-slipping, provided they are kept in a straight course and laterally level, as they will automatically drop the nose as soon as the speed becomes so low that the elevators have little or no effect. Most of the serious accidents start at a height insufficient for the machine to get out of its side-slip before striking the ground. Others strike the ground at the later stage, usually a nose-dive, but in some cases a spin. If sufficient height remains after the machine assumes a nose-dive there is no reason why it should not be pulled out and a normal glide resumed; but in the other event, although it is possible to get out of a spin, it is far more difficult a proposition than the instinctive manœuvre of pulling up out of a nose-dive.

A spin is the extraordinary turning movement that some machines only too readily take up after being stalled on a turn or being turned too flatly even with plenty of flying speed. This is due to the machine suddenly meeting the air a great deal out of the parallel with its longitudinal axis either through side-slipping, skidding or yawing in the air. Having had more than one involuntary spin, but having been fortunate enough to have sufficient height to get out again, I feel the matter is not to be treated too lightly. The position a machine assumes in a spin is a rapidly revolving side-slip or a fairly steep spiral dive, with this rather serious drawback, that the more one tries to pull it up by means of the elevator the faster it spins. No matter how high one is, if one persists in trying to pull it out in a normal way, it will remain out of control because the elevator has now become the rudder, and, instead of pulling it out, increases the speed of turning. If the controls are abandoned the machine will come out of its own accord, but personally I have always found the best and quickest remedy for spins is to straighten the rudder and shove the joy-stick forward; a clean nose-dive will then result, out of which the machine can be pulled. I think in the matter of spins prevention is better than cure, and it is up to the designers to see that their machine is of the non-spinning type, as, however clever and quick the pilot may be in applying his pet remedy, he may not have height enough to do so, and the results are usually disastrous.

The errors in judgment which are made in landing account for crashes galore, but these, fortunately, are usually a small matter compared to those mistakes made in the air, seldom resulting in more than a smashed landing chassis. Flying experience is the only remedy for this particular fault. Landing with the wind will sometimes end in a crash through the machine over-running the limit of the landing ground; whilst landing side to wind will buckle wheels and wreck chassis. Neither of these troubles is always the direct fault of the pilot. An easily distinguishable standard type wind vane on every recognised landing ground would considerably lessen crashes from these causes.

Accidents directly due to faulty construction of the aeroplane are fortunately comparatively rare, as when they happen the results are so often fatal. They occur, however, even on standard types. In some cases the aeroplane is not entirely at fault, as in these days of heavy high-speed efficient machines with so little head resistance and which attain colossal speeds on diving, it is such an easy matter for the pilot to increase the load beyond the highest factors of safety. One has only to consider the load on the wings of a machine dived at 160 m.p.h. when it is pulled out with a heavy hand. Constructional failures of machines in the air can sometimes be traced to damage inflicted by imperfect landings, usually to the back part of the *fuselage* in the region of the tail skid. This gets overlooked, and subsequently the tail gives way under any extra stress whilst flying.

I should like here to be permitted to make a suggestion for the consideration of our Chairman for what it is worth, *i.e.*, that a detailed record be kept of every engine failure, forced landing or accident of every kind and description that happens—at any rate, at all home stations. These records to be collected and classified so that valuable data may always be available. However, some such system as this may already be in operation.

Training of Pilots.

I now come to a few points which might be brought forward from my experience with instruction of pilots. I think that a great deal of time and expense might be saved if some form of medical test were applied to prospective pilots, such as I understand is done in France, where the effect of sudden shocks upon the system of the candidate is recorded by mechanical means, and other tests are made which are supposed to give a fair indication at once of the medical fitness and the possession of the necessary qualities, such as nerve, judgment and the presence of mind required for the making of a pilot. There are many pupils on whom a lot of time and material has been wasted in the endeavour to make pilots of them who simply do not possess these ordinary qualities, and it is not until they have had smash after smash that it is discovered they simply have not got it in them. Now the French method should weed out the non-suitable candidate beforehand.

Personally I consider that the nearest equivalent to the art of flying is that of motor car driving. A person who thoroughly understands and who can drive a car really well should possess the qualities required for piloting an aeroplane. General Brancker, in the paper he read a short time ago before the Society, mentioned a good horseman as the type possessing the necessary qualifications. I agree that good hands, a good head, steady nerves and judgment are essential qualities, all of which should be found in a good motorist, with this advantage, that the good motorist is more likely to be naturally mechanical, a faculty in-born and not easily acquired, and so important in the matter of flying.

Time and material would be saved, in my opinion, if the modified "penguin" type of machine were more generally used for the very earliest training. I refer to the small-powered machine, incapable of leaving the ground, but designed solely for taxiing about the aerodrome, which was generally in vogue at the Blériot Schools before the war. On this machine the pupil can be loosed off alone immediately after preliminary explanation with comparatively no risk, and at the same time he would get used to controlling his engine, have plenty of practice in the use of that important control, the rudder, and lastly, but not least, he would have to be left to his own resources, use a little initiative, and get used to the noise and wind from his motor. This type of machine might be modified in such a way that the other controls might be brought to play an active part in piloting the "penguin" over the ground. The whole *fuselage* and wings might be supported independently of the landing chassis (or rather the rolling chassis) in a sort of gimballs, so that it could be banked and elevated by the control lever whilst running along or turning. I think an hour's taxiing on a machine of this type would, as a preliminary, be of more assistance than the same amount of dual control, as the pupil would know at least more about the use of his rudder.

The best type of aeroplane to use for instruction in actual flying and the question as to whether it should be stable or not are very debatable points. I do think, however, that the less efficient within certain limits the early training machine is, the better and sounder will be the elementary knowledge and experience gained by the pupil. Such experience is likely to be very valuable when, later in his career, he is confronted with engine failures or similar predicaments, where his reserve of engine power will no longer cover up his multitude of sins in piloting. To illustrate this point, let us assume that there are two pupils, A and B. A has qualified for his Aero Club certificate on a box kite—*i.e.* early Henry Farman type biplane—fitted with 50 h.p. Gnome. B gets his certificate on a much more powerful machine, one that can climb quicker, and can even be turned and climbed a bit at the same time. He knows this is so because he has done it on his last eight. But A finds that to get round really comfortably on his he feels compelled to drop the nose a little, as it feels a little sloppy otherwise. At a later date on valuable Service machines, both A and B have engine failures. A lands successfully, B crashes badly through turning too

flatly. A has learnt from the beginning that he was always on the safe side in dropping her nose a bit on a turn; B always thought it unnecessary.

Personally I do not think that the stable machine is the best for training. If it is considered so on the score that once in the air it will look after itself and so reduce the chances of the pupil crashing, then we have only to assume for the sake of argument that a self-landing training machine has been devised that will automatically land itself correctly, do away with the smashes on landing, and ultimately, with a few more improvements, all the pupil need do would be just to sit still and take the air, as everything would be done for him; but after many hours of joy-riding on this super-school machine he would have learnt very little about piloting. For securing Aero Club certificates for pupils at so much a head as a commercial proposition, this sort of machine might be excellent, but the unstable machine should be used as the basis of training to get the best results in the end.

I now come to another question, over which there is a deal of controversy. It is the use of instruments for training. I consider instruments as valuable accessories to any machine, but only under certain circumstances are they necessities, and in training they should not be regarded as indispensable. It is the wrong system, in my opinion, for the pupil to be made to rely on them too much. Although flying is largely a mechanical procedure, there is a tremendous lot of the personal sensation and feel that the pilot should acquire which, when once acquired, will take the place of practically any instrument devised. For instance, could an ice-skater learn to do the outside-edge merely by looking at a bubble of a spirit-level fixed in front of him? I should say no, but once he had acquired the feeling that he had correct balance, which only practice can give, he will make his sharp turn on the outside-edge at the correct angle better than any instrument could show him. Therefore I say let the pupil acquire without delay that naturally instinctive feeling so absolutely essential for a good pilot. Whilst he is taught to rely on his instrument too much to climb, turn, or even try and land, he will be long (if ever) in acquiring the art that will make him independent of instruments.

Personally I seldom use an instrument as an assistance to piloting. Do not assume that I am sneering at instruments; in fact, as I have stated, there are times when they are a necessity. In fact, I am going to suggest that one more instrument be fitted as a standard equipment, an instrument to reduce the risks connected with flying in clouds. It may not generally be known that there have been such a large number of fatal accidents during the last three years entirely due to flying through clouds, and I consider this subject wants going into pretty carefully. The accidents to which I refer have not been questions of a want of height; the machines have become hoplessly out of control. I will give you an instance which happened to myself a few weeks ago in the West of England. You will then realise why I consider this is a serious matter requiring particular attention. I set out on a very cloudy, windy day, to do a test climb to 10,000 ft. on a late type two-seater. I had so often on previous occasions succeeded quite comfortably in reaching this height in spite of cloudy, overcast days, by pushing up through the clouds, usually only a matter of a few minutes, into bright sunlight and the bluest of skies, and, after reaching the desired height, coming down again through the clouds, having flown by compass and time. On this particular day, however, the wind was very gusty, and on reaching 1,200 ft. we got into dense rain cloud, but carried on to beyond 5,000 ft., still in the cloud, when the compass apparently began to swing (really it is the machine that begins swinging, not the compass), and efforts to check the compass had the effect of causing it to swing more violently in the other direction. The air speed then rushed up far beyond normal flying speed. All efforts to pull her up checked her only slightly. Then the rudder was tried; back went the air speed to zero. There was an unusual uncanny feeling of being detached from the machine, and I knew her to be literally tumbling about in the clouds. All efforts to settle down again to a straight flight seemed to be unavailing, until we emerged from the cloud very nearly upside down. Assuming control again was then an easy matter. This sort of thing has happened to me more than once, and, in the Flying Corps vernacular, "it puts the wind up you," and it has happened many times with other pilots. In some cases they emerge from the clouds in a spin, others are known in which the planes have collapsed under the strain of the sudden pull-up from the vertical nose-dive. A few days ago a squadron commander told me that on one occasion when in France everything loose in his machine fell out whilst in a cloud. A week or so ago, on the South Coast, a machine disintegrated in a cloud, and the main planes landed half a mile from the *fuselage*. From my own experience this is a very unpleasant state of affairs, and, in consequence, I avoid clouds when possible. Let us try and examine the cause of this. First of all you must realise that in a cloud you see nothing whatever but your machine around you. There is no fixed point visible. The only means by which you can tell if you are flying in a straight course is by your compass and your air speed. The compass should give you your direction horizontally, your air speed your direction vertically. The first thing that happens, and very readily too, if windy and bumpy, is that your compass card will begin to move slightly. It really appears to you that the compass was suddenly affected by the cloud, and you are still flying straight ahead. How often you hear a pilot say that as soon as he got into a cloud his compass started spinning. The moment the compass starts moving it requires extremely delicate ruddering to get it back to a steady position; in fact, one invariably over-corrects the compass movement, and so the trouble begins. Once the compass starts on a good swing I have found it nearly an impossibility to get it steady again until out of the cloud. Before your compass starts to move your machine has already started to turn. You rudder the opposite way to check it, over-correct it, and turn sharper the other way on to a bank turn; then the nose drops and speed goes up. Pulling back your elevator lever has little or no effect, for if you are banked above an angle of 45 degrees the elevator becomes the rudder. All this occurs without the pilot being in the least bit aware of the position that his machine is taking relative to the ground. The instruments available are of little service once he loses his control.

Of what use is his air speed indicator to him indicating 150 m.p.h. if the machine is on a spinning spiral and he imagines that he is merely descending too fast on a steep, straight glide? He naturally tries to pull up, but with no effect. The bubble does not help him, as centrifugal force will send that anywhere. It may be argued that if a stable machine is left alone under these circumstances it will right itself eventually and assume a normal glide. It very likely would if the pilot could steel himself to let it entirely alone, but before it did so it would have to be left to do a sheer vertical nose-dive for some moments, and in these days of big weights and little head resistance one is liable to attempt to pull out too suddenly from the dangerous high rate of speed attained on this dive. What I want to see fitted is an instrument which will show a constant vertical or horizontal line and be independent of centrifugal force. I have no ideas upon the subject nor suggestions as to how this is to be brought about, unless something in the nature of a small gyroscope driven by an airscrew could be employed in some way to meet the requirements of flying in clouds, but until something is provided so that the pilot can see a fixed line, I think we shall continue to have accidents from this cause.

The most marked development in the modern machine is its extraordinary capacity for climbing to a great height in a short time. At the beginning of the war the average height flown on active service was 4,000 to 5,000 ft., simply because few of the machines then in use with the impedimenta carried could get much higher. To-day a height of 20,000 ft. is, I believe, on certain occasions reached, and it is fairly certain that if progress continues at its present rate, heights a great deal beyond this figure will be reached as a usual thing. These great altitudes bring forward many difficulties which will have to be seriously considered. The first trouble in the winter will be the extreme cold to which the occupants will be subjected unless they are protected by special cowling which will gather in the warmth given off from the engine. This, to a certain extent, is the natural advantage obtained in the tractor. The question of the difference in the comfort of machines in this respect was shown to me in a very marked manner last winter. I was testing the falf-off of engine power at a height on a tractor two-seater, in which it was specially arranged that the warm air from the radiator and engine passed along the *fuselage* to the pilot and then to the passenger, and although at a height of over 21,000 ft. with the thermometer below freezing at ground level, I did not suffer in the least from the cold, neither did my passenger who sat behind complain until we shut off to descend. As a contrast to this, a few days later I was on a single-seater scout at an altitude of 17,000 ft., and although it was a tractor with a rotary motor, I suffered intensely from the cold, and became so numbed that my vitality must have been something akin to a dormouse under the snow, and, in spite of being well gloved, I had frostbitten finger tips, which pained me for many days afterwards. Surely this is a very inefficient state for a pilot at the Front to have to take on an air fight or other exacting work. Put two pilots up to a great

altitude, one kept well warmed and comfortable, the other half dead with the cold, and it would be easy to surmise which would be most likely to do the best work.

I really believe it is more by accident than design that the pilot or passenger have benefited at all in the past from the heat of the engine, with the exception perhaps of the late S. F. Cody's machine. He purposely placed the radiator of his pusher in front of the pilot to keep him warm. I know from my experience when flying in France in the cold weather that the discomfort owing to the extreme cold became intense when flying only at 6,000 ft. on a two or three hours' reconnaissance flight. This is a point to which designers should give attention, especially as machines are now easily capable of reaching great heights. During summer weather conditions would probably be tolerably comfortable, but in winter it would be well-nigh impossible unless better arrangements are generally made.

Cold also affects the motor pretty seriously. This is more noticeable with the water-cooled type. Unless some provision is made for blanketing the radiator surface at heights, it becames far too cold for efficient running. Cases are known of the freezing of the water system on a descent from a great height, with pretty serious results to the motor, as well as the difficulty of getting the engine to run again efficiently through being too cold to effect a landing. In the future war machine the pilot must have a very wide range of control over the water-cooling system.

High Flying.

I have found the effect of high, *i.e.* rarified, air to be felt slightly at about 10,000 ft., increasing with the altitude. Breathing becomes affected, respiration shorter and quicker, there is a curious oppressive sensation and a bulging feeling in the head until the height of about 20,000 ft. is reached. I am told by a medical friend who has made rather a study of the subject that there is always a risk of a sudden collapse, and oxygen should be used whether the aviator feels fit or not. Of course, the effect felt varies considerably with individuals, and with the state of one's health. About eighteen months ago I suffered slightly with my heart, and found I could not get very high without feeling giddy, and after returning from a flight of 12,000 ft. I had palpitation, which lasted until the following day. In consequence I had to abandon high flying until treatment got me fit again. This year I have made a number of high flights, and have felt no ill-effects whatsoever; in fact, I find the more one gets accustomed to going up high the less the effects are felt. I am told that this also is the case in mountaineering. I can remember the unpleasantness of my first flight to 15,000 ft. It was very marked, especially the pain experienced in the drum of the ears on descending. The fact that a flight now to 21,000 or 22,000 ft. does not have so much effect I put down entirely to acclimatisation. I use oxygen as a precaution when ascending beyond 20,000 ft. for the previously mentioned reason. A small bottle is carried, fitted with a special reducing valve, which is fixed in the *fuselage* within easy reach of the hand. No special regulation is required, as it is set to pass only the necessary amount of gas into the face mask which acts as a mixing chamber, with its inlet and outlet air valve. The apparatus weighs 16 lbs., and contains sufficient oxygen for one hour's continuous use. After reaching 20,000 ft. I find it is only necessary to use the oxygen intermittently, and accordingly I simply hold the mask after turning on the gas over the mouth and nose and take a few breaths of it, perhaps every half a minute. The effect to me is remarkable; most of the oppressive feeling vanishes, and, excepting for the unpleasant bulging feeling of the head, which you experience with a bad cold, the sensation is one of suddenly being again at ground level. The only after-effects upon landing from these high altitudes are that you seem to acquire a pretty good thirst, due, I suppose, to the use of oxygen. If the speed of climb continues to improve at the rate it has for the past three years, it looks as though aviators will become subject to what is known as "Cassoon Disease," due, I am told, to the sudden reduction in atmospheric pressure, such as divers are subjected to when they come to the surface from a great depth, owing to the nitrogen which has been absorbed by the system, in proportion to the atmospheric density, forcing itself too rapidly at any lower pressure from the system.

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R.N.A.S. and R.F.C. to Share Gambia's Gift.

THE Secretary for the Colonies announces that the £10,000 contributed by the Government of the Gambia for the purchase of fighter aeroplanes is to be divided equally between the R.F.C. and the Royal Naval Air Service.

The Thames Estuary Raid.

Two Germans, an officer pilot who died from gunshot wounds and a mechanic who was drowned when the machine fell in the raid on the Thames Estuary on June 5th, were buried with naval honours on June 9th.

American Aviators for France.

FROM Washington it was officially announced on June 8th that 100 United States naval aviators, who are to aid in detecting submarine operations and render other services, have arrived safely in France.

A Fight to a Finish.

Mr. W. Beach Thomas, in the *Daily Mail*, gives the following story of the recent fighting:—

"One story of a date just before the battle I must tell.

LIEUTENANT-GENERAL SIR DAVID HENDERSON, D.S.O., K.C.B., who took the chair, in moving a vote of thanks to Capt. Hucks, said he had touched on many subjects and had given enlightenment on a great number of them. Every nation that had had to try to keep up to aeronautic supply had found that the design advanced so quickly that before manufacturers could get into full play the design was obsolete. There was always the choice between having a few of the very best machines and a large number of the next best. It was a difficulty to which there was no solution, and they had not been able to get over it. As to accidents, as far as the records showed, they resulted from a combination of engine failure and faulty piloting—though he by no means intended to blame the pilot, who was taken unprepared by engine trouble and did the wrong thing. Accidents due to faulty aeroplanes were very rare. Still there was no machine, except that used in training, that the pilot could not break, and he did not require to be a Hercules. The danger to fast machines when they travelled nose down had been a subject of investigation, and it was found that they reached a terminal velocity when the air resistance equalled the force of gravity, with the addition of the force of the engine. The breaking occurred only when the pilot tried to pull up the machine, and this was an operation requiring very delicate handling. It ought not to break if there were no faults of material or construction. In regard to the question of medical tests, the French had gone for nervousness, and he thought they were on the wrong tack. It was found that physical disabilities were of more effect than nerves. If they wanted men who could resist sudden shocks they might get one constituted like an ox, but this was the very last type that would produce a good pilot. He believed that we had fewer failures among pilots than the French. A large number of youths had been found unfit for flying at the front, and some people had said that they had "cold feet" but in reality they had recognisable physical diabilities, and after a fortnight in hospital had been turned out fit, and several were flying now. The primary failure had resulted from flying at high altitudes when they had something the matter with them. In nine cases out of ten it had nothing to do with nerves. He was well satisfied with the class of pilots who had been chosen under their system. The question had been raised whether a good horseman or a good motorist made the best pilot, and he preferred the horseman, for the horse was a conveyance that had an intelligence of its own and needed much closer watching than an engine. Also he had noticed that good horsemen often made good motorists, but good motorists did not generally make good horsemen. It had been observed that some airmen used horsey terms in speaking of their machines, and one had said, "She is all right if you treat her well, but if you don't she turns round and savages you."

◈ ◈

A young airman, while duelling, received a bullet in his machinery and knew that he could fly for only a short while longer at reduced speed. His old opponent had vanished, but a new one appeared above him and behind him.

"They were flying just in front of the Ypres salient, and he could make sure of sliding down to our lines, but he knew that if he adopted these tactics the German would pump lead into him all down the slope. The thought was intolerable, so he turned the machine round, and with his last petrol and the last kick of his engine drove straight at the enemy head on. Both fired. The German's nerve appeared to give first and he dipped underneath; then the Englishman turned and dived homewards. He still expected pursuit, but heard nothing and did not look round till he was near the ground, when, to his amazement, he saw the enemy's plane in flames behind him. The two landed in our lines, not half a mile apart, and our young airman jumped from his machine and ran to see the wreck of his enemy's. He found the body of the German pierced by five bullets. He must have been already dead when his plane dipped underneath and avoided collision.

The British Air Services

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, *it is not repeated in this column.*

Royal Naval Air Service.

Admiralty, June 5th.

Flight Sub-Lieut. (Temp.) W. R. Dainty, granted temp. commn. as Lieut. (R.N.V.R.), seniority June 4th, and apptd. to Presdt., addl., for R.N.A.S.

The following have been entered as Probationary Flight Officers (Temp.), seniority as follows, and all apptd. to Presdt., addl., for R.N.A.S.: J. L. Moran; May 13th. W. D. Renshaw; May 29th. V. F. Symondson; May 31st. D. L. Helliwell; June 17th.

Messrs. H. E. Clark and A. R. Clark, both entered as Probationary Observers (Temp.), seniority June 4th, and both appntd. to Presdt., addl., for R.N.A.S.

Temp. commns. (R.N.V.R.) have been granted to the undermentioned, seniority as stated: Lieut. A. C. Lovesy (and apptd. to Presdt., addl., for R.N.A.S.; June 1st), Sub-Lieut. A. E. Watkins; June 4th.

Admiralty, June 7th.

Probationary Flight Officer (Temp.) A. F. Cresswell, granted a temp. commission as Sub-Lieut. (R.N.V.R.), seniority June 6th.

W. J. Rawson, entered as Probationary Flight Officer (temp.), seniority April 17th.

Admiralty, June 8th.

C. E. Turner and L. E. Sawyer have been entered as Temp. Lieut (R.N.V.R.) and Temp. Sub-Lieut. (R.N.V.R.) respectively, seniority June 6th, and both appointed to "President," additional, for R.N.A.S.

M. B. Hughes granted a temp. commission as Assistant Paymaster (R.N.V.R.), seniority June 7th, and appointed to "President" for R.N.A.S.

Admiralty, June 9th.

Chaplain and Naval Instructor.—The Rev. F. W. R. Metcalf, M.A., to "President," for R.N. Air Station, Eastbourne; June 12th.

Admiralty, June 11 h.

The following have been entered as Prob. Flight Officers (Temp.), seniority June 3rd.—J. G. Arnold-Jenkins, C. H. Askwith, H. S. Boulding, J. D. Breakey, F. J. S. Britnell, S. J. Chamberlain, G. M. Clark, C. G. Duckworth, P. A. A. Enright, J. M. Faulks, C. S. Frowd, T. M. Greeves, J. K. Hardy, E. P. O Haugton, H. A. Hince, C. Jewell, T. H. Jones, S. G. Robinson, M. A. Sams, H. C. Smith, H. T. Williams, and W. A. Windsor

R. St. C. Talboys granted a Temp. Commission as Lieut. (R.N.V.R.), seniority June 4th.

Temp. commissions as Sub-Lieut. (R.N.V.R.) have been granted to the following, seniority June 10th: D. F. Lucking (appointed to "President" additional, for R.N.A.S.); and A. B. Macintosh.

Royal Flying Corps (Military Wing).

London Gazette, June 5th.

Special Appointments.

(Graded for purposes of pay as Staff Capts. while comdg. Squdns. R.F.C. Offr. Cdt. Wing.)

Temp. Capt. J. Robertson, attd. R. Scots, and to be transfd. to Gen. List, vice Capt. R. B. Neill, Res. of Off. (Jan. 27th); Capt. R. H. C. Routley, R. Fus., and to be secd., vice Capt. H. W. Sewell, Bord. R., S.R. (Apr. 24th).

Flying Officers.—2nd Lieut. A. B. Campbell, S.R.; May 4th. Temp. 2nd Lieut. (on prob.) R. D. Starley, Gen. List; May 10th. 2nd Lieut. R. Martin, Yeo. (T.F.) and to be secd.; May 13th. Temp. Lieut. G. E. Miall-Smith, M.C., Norf. R., and to be transfd. to Gen List; Temp. 2nd Lieut. R. M. Trevethan, S. Lan. R., and to be transfd. to Gen. List; May 14th. Temp. 2nd Lieut. (on prob.) J. A. Carruthers, Gen. List; May 15th. Temp. Lieut. L. B. Williams, Gen. List, from a Flying Officer (Ob.), seniority June 16th, 1916. 2nd Lieut. H. C. Ainger, R. Scots, S.R., from a Flying Officer (Ob.), seniority Sept. 15th, 1916. 2nd Lieut. B. J. Glynn, S.R.; 2nd Lieut. (on prob.) A. L. Fleming, S.R.; 2nd Lieut. (on prob.) A. E. McVittie, S.R.; Temp. 2nd Lieut. (on prob.) E. B. Crickmore, Gen. List; 2nd Lieut. R. W. Coutts, S.R.; 2nd Lieut. W. Perkins, S.R.; May 16th. The appointments of the following as Flying Officers and their secdg. or transfer to Gen. List are antedated as follows: Temp. Lieut. L. N. T. Stuart-Campbell, British W. Indies R., to Feb. 23rd; Lieut. L. G. Robinson, M.C., Res. of Off., to Feb. 27th; Temp. 2nd Lieut. E. L. L. Turnbull, R.E., to Mar. 5th; Temp. Lieut. T. Owen, S. Staff. R., to Mar. 16th; Temp. 2nd Lieut. L. N. Hollinghurst, Midd'x R., to Mar. 20th; Temp. 2nd Lieut. H. L. M. Dodson, A.S.C., to Mar. 29th; Temp. Lieut. D. R. Cameron, A.S.C., to Mar. 29th; 2nd Lieut. J. McCash, R. Highrs. (T.F.), Temp. Lieut. C. G. Mathew, A.S.C.; 2nd Lieut. E. G. Seth-Smith, E. Surr. R., S.R.; 2nd Lieut. H. Brokensha, R.E. (T.F.) to Apr. 6th.

Balloon Company Commander (Graded as a Squadron Commander).—Lieut. (Temp. Capt.) V. A. Beaufort, Devon R., from a Balloon Co. Comdr. (graded as a Flight Comdr.) and to be Temp. Maj. whilst so empld.; May 19th.

Balloon Commander (Graded as a Balloon Officer).—Temp. 2nd Lieut. G. K. Simpson, Gen. List, from a Balloon officer, and to be Temp. Lieut. whilst so empld.; Jan. 29th. Substituted for the notification of Mar. 5th.

Adjutant.—Temp. 2nd Lieut. (Temp. Lieut.) F. Jefcoate, Gen. List from an Equipment Officer, 3rd Class; Mar. 15th.

Equipment Officers, 2nd Class.—From the 3rd Class, and to be Temp. Lieuts. whilst so empld.: Temp. 2nd Lieut. W. D. Miller, Gen. List; Apr. 1st. 2nd Lieut. T. G. Mellanby, S.R.; May 20th. 3rd Class: 2nd Lieut. P. G. Robinson, S.R., from a Flying Officer; Jan. 9th.

Memoranda.—Temp. 2nd Lieuts. to be Temp. Lieuts. while serving with R.F.C.: G. le B. Diamond, attd. Essex R.; N. J. Rich, R.E.; F. D. Holm, R.E.; F. C. C. Manley, R.H. and R.F.A.; C. P. Ranger, Lan. Fus.; T. C. Lowe, R.E.; L. G. Hall, A. J. E. Etches, J. S. Heagerty, F. J. Woollard, J. G. Spencer; Apr. 1st. A. H. S. Baker to be Temp. Lieut., Gen. List, for duty with R.F.C.; June 5th. The following to be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C.: H. D. P. Jehring; May 4th. T. J. Price; May 15th. R. H. Rivers, F. H. Bartlett, D. W. Edmonds, A. G. O. Ellis, E. W. Dormer, F. J. C. Exton, J. W. Gage, D. Beaumont; June 1st. Corpl. H. G. Gregory, from R.F.C., to be Temp. 2nd Lieut. (on prob.) for duty with the Mil. Wing of that Corps; May 23rd.

Supplementary to Regular Corps.—The following 2nd Lieuts. (on prob.) are confirmed in their rank: A. B. Campbell, B. J. Glynn, H. G. Tinney, W. R. Keast, C. E. Wykes, J. W. Tattersall.

London Gazette Supplement, June 6th.

Flying Officers.—2nd Lieut. R. A. Way, Wilts R., from a Flying Officer (Ob.), Apr. 30th, seniority Dec. 16th, 1915. 2nd Lieut. (Temp. Lieut.) C. S. T. Lavers, W. York. R., S.R., from a Flying Officer (Ob.); May 11th, seniority Sept. 16th, 1916. 2nd Lieut. (Temp. Capt.) I. G. Elias, R. W. Fus. (T.F.), and to be secd.; Temp. 2nd Lieut (on prob.) P. H. Baker, Gen. List; Temp. 2nd Lieut. (on prob.) T. W. Calvert, Gen. List; Temp. 2nd Lieut. (on prob.) C. C. T. Turner, Gen. List; Temp. 2nd Lieut. (on prob.) J. E. R. Young, Gen. List; May 14th. Temp. 2nd Lieut. (on prob.) D. A. Strutt, Gen. List May 15th. Temp. 2nd Lieut. G. C. Tress, attd. Hamps. R., and to be transfd. to Gen. List; May 17th, 2nd Lieut. C. Sutherland, S. Lan. R., S.R., and to be secd.; 2nd Lieut. F. T. Wakeman, R. War. R. (T.F.), and to be secd.; 2nd Lieut. J. Y. Taylor, E. Lan. R. (T.F.), and to be secd.; Temp. 2nd Lieut. (on prob.) W. A. Clark, Gen. List May 18th. Temp. 2nd Lieut. (on prob.) W. M. M. Hurley, Gen. List; May 19th. Temp. 2nd Lieut. R. Whyte, Sea. Highrs., and to be transfd. to Gen. List; 2nd Lieut. (on prob.) F. W. Curtis, S.R.; 2nd Lieut. (on prob.) H. L. Tracy, S.R.; Temp. 2nd Lieut. (on prob.) E. D. Bonisteel, Gen. List; Temp. 2nd Lieut. J. W. Jones, Gen. List; May 30th.

Park Commander.—2nd Lieut. (Temp. Capt.) H. R. Vagg, Som. L.I., from an Equipment officer, 1st Class, and to be Temp. Maj. whilst so empld.; May 1st.

Memoranda.—To be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C., A. S. Monteath; May 1st. A. E. Walter; May 23rd. L. F. Roslyn, R. U. Nash-Taylor, W. L. Vining, C. Liver, A. A. Gardner, S. B. Cave, H. Best, A. E. Richardson, P. J. Bertin; June 1st. Sergt. H. Pollard, from R.F.C. to be temp. 2nd Lieut. (on prob.) for duty with the Mil. Wing of that Corps; May 21st.

General List.—Cdts. to be Temp. 2nd Lieuts. (on prob.): A. E. C. Andrews, L. G. H. Aspinal, F. G. Baker, C. A. Barber, A. Beck, L. A. Beadle, A. C. Beever, W. Bennett, T. J. Benson, N. B. Birkett, H. L. Bluck, C. W. E. Bollard, F. E. Bond, G. H. Box, F. J. Bull, V. Butterworth, H. W. Carlaw, C. H. R. Carmichael, F. B. G. Castleman, R. F. Cole, E. M. Cook, H. C. Cooke, A. S. N. Coombe, H. J. Crofts, J. Cumming, G. W. F. Darvill, J. D. G. Davies, B. Dawe, G. V. de Boissiere, A. Dyer, E. T. Evans, A. G. Franklin, P. F. O. Frith, J. E. Frost, L. F. Geeson, C. S. Gilson, H. S. Gittins, F. R. Goodearle, H. P. Greenhill, L. Grime, W. H. M. Groom, T. H. Hampshire, J. R. L. Hamson, J. L. S. Hanman, P. E. Harris, A. S. Hartley, O. F. Hassett, R. A. Hewat, H. R. Hicks, W. C. V. Higginson, W. W. Hillier, A. S. Hitching, R. B. Hughes, H. D. Humphreys, L. G. Humphries, H. M. Hutton, C. F. Hunt, R. A. Inglis, A. T. Isbell, T. Ivison, H. W. Jones, W. E. F. Jones, J. R. Joseph, R. G. Ledger, E. P. Lewis, G. M. Ling, G. A. Lingham, D. D. Lockwood, R. M. W. Louden, C. S. P. Marquardt, H. A. C. Martyr, A. D. Martin, G. Mason, W. A. McCulloch, A. D. Mount-Stephen Merchant (since deceased), H. R. Milton, C. L. Modlen, B. Monkhouse, D. H. Montgomery, J. S. R. Morgan, L. J. W. Murphy, J. W. D. Needham, A. L. Newell, W. K. Nunnerley, D. H. Oliver, G. L. O'Neill, W. N. Owen, F. W. H. Oxley, D. A. E. S. Palmer-Stone, B. J. Parkes, C. M. Pears, E. O. Peel, C. Pickstone, W. J. Pitt-Pitts, G. L. Platts, C. F. Pritchard, D. Price, N. Ramsden, S. W. Randall, G. R. Ranken, P. Rawnsley, A. F. Reid, J. W. Rogers, R. A. Roth, E. R. Seymour, S. N. Shephard, C. J. Stanfield, E. E. Stock, H. E. Storey, L. H. Sutton, W. E. Theak, J. H. Underwood, R. E. Vale, G. Walker, J. W. Wallwork, S. L. Ward, W. Wild, F. B. Wilkins, W. H. T. Williams, D. W. Winter, H. S. Wolff; Apr. 20th.

London Gazette Supplement, June 7th.

Special Appointments (Graded for pay as Staff Lieuts., 3rd Class).—2nd Lieut. (Temp. Lieut.) F. D. Murphy, A. Cyclist Corps, from R.F.C.; Mar. 26th.

Equipment Officer, 1st Class.—Lieut. J. M. Furnival, S.R., from the 2nd Class, and to be Temp. Capt. whilst so empld.; May 8th.

Memoranda.—2nd Lieuts., S.R., to be Temp. Lieuts. whilst serving with R.F.C.: B. King, Yorks L.I.; J. A. Pullan, Durh. L.I.; A. M. Swyny. R.Ir.R.; A. J. Macnab, Arg. and Suth'd. Highrs.; E. H. Pember, R.F.A.; V. S. Robotham, R.F.A.; E. G. Seth-Smith, E. Surr. R.; H. F. Barnes, M.C., R.G.A.; J. C. Crosbie, R.G.A.; E. G. Richardson, R.G.A.; M. E. Stutchfield, R.F.A.; May 1st. 2nd Lieuts. (T.F.) to be Temp. Lieuts. whilst serving with R.F.C.: P. Warbarton, R.G.A.; H. Tatton, Yeo.; F. W. Musson, N. Lan. R.; D. F. Lepraik, Midd'x. R.; S. A. Harrison, A.S.C.; G. R. G. Topham, Lond. R.; J. H. Baring-Gould, Yeo.; G. F. Court, Essex R.; D. J. de A. Bird, R.H. and R.F.A.; R. W. Reeve, Hereford. R.; A. Barr, R. Highrs.; W. A. N. Smith, R.E.; J. B. Weir, Sea. Highrs.; C. E. W. Chapman, R.H. and R.F.A.; G. R. Y. Stout, Arg. and Suth'd Highrs.; D. Lindsay, A. Cyclist Corps; W. G. Breen-Turner, R. W. Fus.; C. J. Pullen, R.G.A.; C. F. Smith, L'pool R.; H. M. Coombs, R.H. and R.F.A.; C. F. Linton, R.E.; D. W. Forshaw, S. Wales Bord.; G. W. Jackson, North'd Fus.; A. R. Adam, Sea Highrs.; H. A. Smith, Midd'x R.; N. Mellor, W. Rid. R.; R. V. Hamilton, R. War. R.; E. St. T. W. Freer, Yeo.; C. D. Thompson, H.A.C.; F. J. Kydd, L'pool R.; G. J. Frost, E. Surr. R.; F. P. Allbutt, R.W. Fus.; A. J. Allen, L'pool R.; O. L. McMaking, Yeo.; C. W. Fidler, Arg. and Suth'd Highrs.; May 1st. 2nd Lieuts. to be Temp. Lieuts. whilst serving with R.F.C.: H. Good, H. M. Parsons, E. H. Cambridge, F. Nuttall, A. J. O. Spiers, R. M. Drummond, E. M. Roberts, W. H. Longton, J. E. B. Thornely, S. N. Pike, F. de B. Collenette, R. L. Graham, C. Baines, G. W. Riley, P. W. M. Orme (since deceased), A. P. Pycroft, H. G. Kirk, C. H. Graham R. C. Boddie, W. Sutherland, W. G. M. Nicholl, F. G. S. Williams, K. S. Henderson, G. Heasman, attd. K.E. Horse, S.R.; May 1st.

London Gazette, June 8th.

Special Appointment (graded as a Flight Commander).—Capt. R. H. D. Lee, Norf. R. (T.F.), from a Flying Officer; May 16th.

Flying Officer.—Temp. Capt. H. R. Gunning, Gen. List; Mar. 24th.

Adjutant.—Lieut. H. P. S. Clogstoun, S.R., from a Flying Officer; April 14th.

Memoranda.—2nd Lieuts., to be Temp. Lieuts. whilst serving with R.F.C.: J. C. Barraclough, York. R.; R. I. Kirton, K.O. Sco. Bord.; W. O. Hatcher, Sco. Rif.; R. Holmeyr, Yorks. L.I.; J. R. Taylor, Rif. Brig.; E. N. Holstius, Durh. L.I.; R. M. Chaworth-Musters, Leic. R.; F. D. Holder, E. Kent R.; J. Duncan, Bord. R.; E. B. Rice, R. Dub. Fus.; May 1st.

To be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C.:—B. C. Akehurst; May 5th. W. J. Hembry; June 1st.

Temp. 2nd Lieut. S. H. Ricardo relinquishes his commission on account of ill-health contracted on active service, and is granted the hon. rank of 2nd Lieut.; June 9th.

The name of William Reginald Fitzgerald is as now described, and not as in the *Gazette* of Feb. 6th, 1915, and in subsequent *Gazettes*.

Supplementary to Regular Corps.—The following 2nd Lieuts. (on prob.) are confirmed in their rank:—H. L. Tracy, A. Chapple, D. G. Moreton G. A. Wells, A. E. McVittie, E. N. Hately, F. W. Curtis and C. F. Le Poer Trench.

London Gazette Supplement, June 9th.

Flight-Commanders, and to be Temporary Captains whilst so employed.—Lieut. J. Mitchell, M.C., R.A., from a Flying Officer; April 19th. 2nd Lieut. (Temp. Lieut.) D. F. Stevenson, Yeo. (T.F.), from a Flying Officer; May 23rd.

Flying Officers.—2nd Lieut. E. O. Perry, Notts and Derby. R. (T.F.), and to be secd.; 2nd Lieut. (on prob.) S. J. Young, S.R.; Temp. 2nd Lieut. L. G. Bacon, Gen. List; Feb. 8th. Temp. Lieut. S. F. Lydon, Gen. List, from a Flying Officer (Ob.); Mar. 22nd, seniority June 2nd, 1916. 2nd Lieut. G. Nelson, Sco. Rif., from a Flying Officer (Ob.); May 7th, seniority June 18th,

1916. 2nd Lieut. (Temp. Lieut.) B. K. D. Robertson, Glouc. R. (T.F.), from a Flying Officer (Ob.); May 16th, seniority May 13th, 1916. Lieut. E. A. Simson, R.F.A., S.R.: 2nd Lieut. B. Ankers; May 17th. Temp. 2nd Lieut. (on prob.) W. R. Rogers, Gen. List; May 18th. Capt. E. D. Messervy, Lond. R. (T.F.), from a Flying Officer (Ob.), seniority Feb. 28th, 1916; 2nd Lieut. H. F. McArdle, King Edward's Horse, S.R., and to be secd.; Temp. 2nd Lieut. H. E. Judge, Gen. List, from a Flying Officer (Ob.), seniority July 15th; Temp. 2nd Lieut. F. E. Bishop, Gen. List; Temp. 2nd Lieut. (on prob.) A. W. Little, Gen. List; 2nd Lieut. (on prob.) G. A. Wells, S.R.; 2nd Lieut. J. G. Dainty, Leic. R. (T.F.), and to be secd.; Temp. 2nd Lieut. (on prob.) C. R. Perring, Gen. List; May 19th. 2nd Lieut. R. E. Bion, Hrs., S.R.; Temp. 2nd Lieut. (on prob.) A. F. Percy, Gen. List; Temp. 2nd Lieut. (on prob.) C. G. Salmond, Gen. List; May 21st. Temp. Lieut. D. M. Deighton, M.C., Gen. List, from a Flying Officer (Ob.), seniority Mar. 13th, 1916. Temp. 2nd Lieut. J. S. Williams, M.C., Gen. List, from a Flying Officer (Ob.), seniority June 26th, 1916; 2nd Lieut. (on prob.) C. R. Richards, S.R.; May 22nd.

Flying Officer (Observer).—Temp. 2nd Lieut. R. A. Wingfield, R. Ir. Fus.; Oct. 8th (substituted for the notification in the *Gazette* of Oct. 27th).

Balloon Officers.—Temp. 2nd Lieut. (on prob.) R. A. Fleck, Gen. List; Temp. 2nd Lieut. (on prob.) L. H. S. Harben, Gen. List; Temp. 2nd Lieut. (on prob.) F. C. Harrison, Gen. List; Temp. 2nd Lieut. (on prob.) B. B. Keele, Gen. List; Temp. 2nd Lieut. (on prob.) W. H. Martin, Gen. List; Temp. 2nd Lieut. (on prob.) J. E. Morgan, Gen. List; May 1st. Temp. Lieut. H. W. Tait, Durh. L.I., and to be transfd. to Gen. List; Temp. 2nd Lieut. L. Wood, A.S.C., and to be transfd. to Gen. List; May 17th.

Equipment Officer, 3rd Class.—Lieut. (Hon. Lieut. in Army) F. J. Cooke, from R. Defence Corps (T.F.), and to be Temp. Lieut. on Gen. List; April 26th.

Memoranda.—The following to be Temp. 2nd Lieuts. for duty with R.F.C.: Sergt. H. L. Marvin, from R.F.C.; April 16th. J. H. Moore; May 12th.

General List.—Cadets to be Temp. 2nd Lieuts. (on prob.): A. W. Allan, F. V. H. Anderson, R. F. Auerbach, W. C. Balmford, B. C. L. Barton, F. W. Bethell, W. Boness, T. A. Briggs, E. C. Bromley, J. Burdekin, W. E. Beckett, J. F. Bushe, L. A. Bushe, O. E. Carter, C. Clarke, H. Clarkson, L. H. Clemetson, J. L. Callie, E. A. Cooke, R. M. Chiswell, F. D. Coleman, G. S. Cosgrove, C. F. Cowper, J. H. Cremonini, G. R. Davies, R. Done, M. H. Drake, W. F. Dry, R. H. Garratt, O. C. George, D. G. Gold, J. W. Grose, G. A. Gillings, C. G. D. Gray, J. A. Gurney, G. S. Hankinson, W. A. Hine, J. R. Hatchett, D. R. Hunt, K. J. Isaac, B. W. Knuckey, B. M. T. S. Leete, G. A. C. Manley, W. L. McIlwraith, E. G. MacLeod, C. F. Macpherson, R. E. Mansfield, F. A Martin, I. R. Mees, H. W. Oliver, N. Parkinson, A. J. D. Peebles, J. H. Pottinger, E. Pybus, J. N. Raby, A. H. Rice, C. G. Rickards, J. D. Robinson, H. L. Rough, R. V. Sessions, J. A. H. Sesyre, J. E. L. Skelton, H. J. C. Spencer, W. R. F. Stokes, J. Surfleet, T. H. Timmis, E. B. Tipping, A. Thompson, W. Thompson, H. H. Tonks, C. L. Turnbull, G. N. Traunweiser, R. A. Vosper, E. Waterlow, H. J. Welch, E. H. Williams, P. Wilson, J. B. H. Wyman, J. V. Yates, F. Spalding; May 17th. S. Chapman, C. W. Jacot, R. H. Johnson, F. M. Nash, V. A. Powell, G. M. Stephenson, R. S. Swanton; May 19th. C. G. Holbeche, N. S. Taylor; May 21st. A. E. Connolly, W. Hardy, R. B. T. Hedges; May 23rd.

London Gazette, June 11th.

Squadron Commanders.—From Flight Commanders: Maj. A. J. Ross, D.S.O., R.E., Capt. V. A. Albrecht, M.C., Manch. R., and to be Temp. Major whilst so employed; May 16th.

Flight Commanders.—From Flying Officers, and to be Temp. Capts. whilst so employed: Temp. 2nd Lieut. C. G. Eccles, Gen. List; May 3rd. Lieut. F. McD. C. Turner, S.R.; May 7th. Temp. Lieut. C. A. Bourne, Gen. List; Temp. 2nd Lieut. W. G. Barker, M.C., Gen. List; May 9th. 2nd Lieut. A. Coningham, S.R.; May 10th. 2nd Lieut. (Temp. Lieut.) T. M. Southorn, R.F.A. (T.F.); May 11th. Lieut. J. R. Anthony, R.W. Fus. (T.F.); May 13th.

Flying Officers.—2nd Lieut. C. G. Davenport, R.F.A. (T.F.), and to be seconded; May 1st. Temp. 2nd Lieut. (on prob.) C. N. L. Lomax, Gen. List; May 8th. 2nd Lieut. E. N. Hately, S.R.; Temp. 2nd Lieut. (on prob.) W. V. Jakins, Gen. List; Temp. 2nd Lieut. (on prob.) A. H. Jarvis, Gen. List; May 10th. Temp. 2nd Lieut. C. K. M. Douglas, Gen. List, from a Flying Officer (Observer), with seniority from Nov. 17th, 1915; Temp. 2nd Lieut. (on prob.) N. H. Lahaye, Gen. List; Temp. 2nd Lieut. (on prob.) T. H. MacDonald, Gen. List; May 11th Temp. 2nd Lieut. (on prob.) G. R. Wight, Gen. List; May 14th.

Flying Officers (Observers).—2nd Lieut. W. S. King, Newfoundland Regt.; May 20th, with seniority from Feb. 23rd. Temp. Lieut. D. C. Eglington, R. Highrs., with seniority from March 4th; Capt. J. A. Stanbrook, Lond. R. (T.F.), with seniority from March 8th, and to be seconded; May 21st. Lieut. L. A. Kiburz, Canadian Gen. List; Lieut. S. L. Shannon, Canadian Inf.; May 20th, seniority March 25th). Temp. Lieut. D. T. Caulfield-Kelly, R. Dub. Fus., and to be transferred to Gen. List; May 21st, seniority April 7th. Rank of Temp. Lieut. W. T. Gilson, Gen. List, is as now described, and not as in the *Gazette* of March 22nd.

Equipment Officers, 1st Class.—From the 2nd Class, and to be Temp. Capts. whilst so employed: 2nd Lieut. (Temp. Lieut.) D. Hodgson, Cyclist Battn. (T.F.); April 25th. 2nd Lieut. (Temp. Lieut.) F. E. Pike, S.R.; Temp. Lieut. A. E. Biscoe, Gen. List; May 1st.

2nd Class.—Temp. 2nd Lieut. G. F. Drudge, Gen. List, from the 3rd Class, and to be Temp. Lieut. whilst so employed; Temp. Capt. R. G. Taylor, Gen. List, from the 3rd Class; May 1st. From the 3rd Class, and to be Temp. Lieuts. whilst so employed: 2nd Lieut. R. H. Whittington, S.R.; 2nd Lieut. E. A. Mayner, S.R.; 2nd Lieut. C. J. W. Hosken, S.R.; May 1st. Major C. K. Butler-Stoney, T.F., Res., from the 3rd Class; May 19th.

3rd Class.—2nd Lieut. R. N. Liptrot, R.F.A. (T.F.), and to be seconded; May 23rd; Temp. 2nd Lieut. (on prob.) H. C. C. Gates, Gen. List; May 23rd.

Memoranda.—Temp. 2nd Lieut. (on prob.) M. A. Hancock, Mach. Gun Corps, is transferred to Gen. List for duty with R.F.C.; Feb. 10th.

Supplementary to Regular Corps.—The notification in *Gazette* of May 17th of the appointment of R. Trewby as 2nd Lieut. (on prob.) is cancelled.

2nd Lieuts. (on prob.) confirmed in rank: W. Duff, F. E. M. Bussy, A. L. Fleming.

FATAL ACCIDENTS.

ON the morning of June 7th, Captain J. Taylor Lohan and 2nd Lieut. G. C. Alger were killed in Scotland. Their machine took a spinning nose-dive to the earth, and Lieut. Alger was killed on the spot, while Captain Lohan died in hospital shortly afterwards.

2nd Lieut. Wardlaw Ivor Thomson, R.F.C., was killed on June 7th during a flight on the South Coast. His machine nose-dived to the earth.

An inquest was held on June 4th on Sergt. W. C. Turner, R.F.C., who was killed on the previous day. He had been training as a pilot, and was making his first flight alone. All went well, and he had good command of the machine, but on descending he overshot the mark and went up into the air again. Getting to a height of about 1,000 ft. he appeared to lose his nerve in making another descent, and giving too much "left rudder" the aeroplane took an erratic downward course, finishing with a nose-dive. The force of the impact with the ground caused the petrol tank to burst, and Turner was badly burnt before he could be extricated. It was then found that he had sustained fracture of the skull and dislocation of the neck, and death had occurred before the petrol tank burst. A verdict of "Accidental death" was returned.

2nd Lieut. Higgs, R.F.C., died on June 9th in Northampton Hospital of injuries received in an accident to his machine near Blisworth Railway Station on the previous day. At the inquest it was stated that it was Lieut. Higgs' first flight alone, and he landed on sloping ground which accelerated the pace of the machine, while the grass was so long that it caught in the landing wheels, causing the machine to turn over. A verdict of "Accidental death" was returned.

Whilst making a flight at a South Coast aviation station on the evening of June 6th, 2nd Lieut. Wardlaw Ivor Thomson, of the R.F.C., was killed, his machine nose-diving to earth.

While a party of R.F.C. officers were receiving instruction in machine-gun firing near Rugby on June 6th, 2nd Lieut. S. F. Porter was struck by the bullets, and has since died of his injuries.

A verdict of "Accidental death" was returned at an inquest on the South Coast on June 11th on Captain B. J. W. Moore, M.C., R.F.C., who was killed by a nose-dive of the aeroplane he was piloting on the previous day. Another officer who was undergoing instruction was seriously injured, but is expected to recover.

More Escapes from Germany.

ACCORDING to *The Times* correspondent at Berne, Captain A. J. Evans, R.F.C., and Lieut. S. E. Buckley, Northamptonshire, attd. R.F.C., arrived in Berne on June 9th, having escaped from Germany. Captain Evans was reported missing in July, 1916, and Lieut. Buckley in December, 1915.

The Kaiser in an Air Raid.

DETAILS received by the frontier correspondent of the Dutch *Telegraaf* go to show that the Kaiser and Marshal von Hindenburg had a narrow escape in the Allied raid on Ghent on Whit Monday. They were waiting at St. Pieter's Station when the bombs fell on the station and neighbouring premises and five soldiers were killed within 200 yards of the station. Another report states that three officers who were in attendance on the Kaiser were killed.

Famous German Pilot Killed.

A KREFELD telegram to the *Rheinisch Westfaelische Zeitung* announces that Lieut. Schaefer has been killed in a fight with a British air squadron while leading his own squadron. Schaefer, who was 25 years old, had been decorated with the order Pour le Merite, and on June 6th was reported as having shot down his thirtieth enemy machine.

Another German Apology.

As expected, the German Minister at The Hague, on behalf of his Government, has expressed his regret for the cruising of a Zeppelin on June 2nd over the province of Groningen. He explained that the commander of the airship was unaware that he was over Dutch territory owing to the low clouds.

German Killed by his Own Bombs.

THE *Matin* states that on June 4th a German biplane in coming down near the railway line between Lizy-sur-Ourcq and Isles les Meldeuses, struck a telegraph post. The machine at once overturned and caught fire. Two railwaymen who appeared on the scene saw two German officers get out of the biplane, and as they were approaching a bomb burst owing to the heat, killing a German and one of the railwaymen and wounding the other. The other officer, who had escaped, was discovered hiding under a tree in a neighbouring wood, and was taken to the police station at Lizy-sur-Ourcq.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

British. *General Headquarters, June 5.*

"There was great activity in the air again this day, and bombing was continued by day and night with good results. Twelve German aeroplanes were brought down in air fighting, one of which fell within our lines, and six other hostile machines were driven down out of control. Five of our aeroplanes are missing."

War Office, June 6.

"*Salonica.*—Our aeroplanes have effectively bombed Demir Hissar station, Tusculu (north-east of lake Butkova), and Furka and Bogdanci (west of Lake Doiran).

"*Egypt.*—Our aviators have successfully bombed the enemy camps at Gaza, Hareira, and Beersheba."

General Headquarters, June 6.

"Activity in the air continued yesterday. Eight German aeroplanes were brought down in air fighting, one of which fell within our lines, and eight other hostile machines were driven down out of control. Seven of our machines are missing."

General Headquarters, June 7.

"There was again great activity in the air yesterday, and many fights took place. Five hostile formations, one of which consisted of over 30 machines, were attacked and dispersed with heavy casualties. In the course of the fighting nine German aeroplanes were brought down, and at least nine others were driven down out of control. Six of our aeroplanes are missing."

General Headquarters, June 8.

"During the battle our aircraft yesterday co-operated very successfully with both infantry and artillery, performing valuable services. In addition, a large number of successful air raids were carried out, during which the enemy's aerodromes, balloons, trains, billets, depôts, and troops were attacked with bombs and machine guns. The enemy aircraft were prevented from taking part in the battle. We accounted for 12 German machines brought down and eight others driven down out of control. Fourteen of our machines are missing."

War Office, June 8.

"*East Africa.*—Successful bombing raids against enemy depôts at Tunduru and Liwale have been carried out by our air service."

French. *Paris, June 7.*

"Two enemy machines were brought down yesterday. Further information received records the certain destruction of three more German machines, which were brought down by our pilots on June 3, 4 and 5."

Paris, June 8.

"During the day of June 7 our aeroplanes rained bombs on the railway stations of Avricourt and Reschicourt, and on different troop cantonments in the region of Vouziers."

Russian. *Petrograd, June 4.*

"A German aeroplane was brought down by our artillery in the region of Lake Nobell, and fell in the enemy's territory."

Petrograd, June 7.

"A number of our aeroplanes made a series of flights over the rear of the enemy and dropped bombs."

Italian. *Rome, June 4.*

"Along the whole front yesterday there was considerable air activity. One enemy machine was brought down by fire near Mt. Zobio, a second machine fell in flames near Plava, and the pilot of a third was forced by our airmen to descend in his line. During the night enemy aircraft bomed Codigoro, but there were no victims and no damage was done. Our squadrons bombed hutments and enemy troops assembled at S. Lucia of Tolmino, at Chiapovano, and at the railway station of Rifemberga."

Rome, June 6.

"Aerial activity was intense. One enemy machine was beaten down by gunfire near Moos Sexton Valley, and another was brought down during an air fight between the Vodice and Mt. Santo. Last night our bombing squadrons, in spite of the violent shelling of hostile anti-aircraft guns, dropped over two tons of high explosives on the station of St. Pietro, on the Trieste-Lubiana (Laibach) Railway. Our machines returned safely."

German. *Berlin, June 5.*

"Aerial activity was very lively throughout the day and night on the whole of the front. Yesterday 12 enemy aeroplanes were shot down in aerial battles and by our anti-aircraft guns. Lieut. Voss brought down his 32nd, Lieut. Schaefer his 30th, and Lieut. Allmenroeder his 24th opponent in aerial battles."

Berlin, June 6.

"During numerous aerial battles along the front the enemy lost 11 aeroplanes. Lieut. Allmenroeder secured his 25th and 26th victories and Lieut. Voss his 33rd.

"*Balkans.*—On the eastern bank of the Struma English aviators dropped incendiary bombs on the ripening cornfields."

Berlin, June 7.

"Yesterday eight English aeroplanes were shot down in aerial battles, one by Lieut. Voss, who thereby won his 34th aerial victory."

R.N.A.S. Work in Belgium.

THE following announcements have been issued by the Admiralty :—

June 5th.

"Naval aeroplanes carried out an attack on the night of June 3rd–4th on the aerodrome at St. Denis Westrem, near Ghent, and many bombs were dropped, with good results. The enemy seaplane base at Zeebrugge was attacked by our seaplanes at the same time, and the shipping in Bruges was also bombed. All our machines returned safely."

June 6th.

"Photographic reconnaissance over Ostend shows that as the result of yesterday's bombardment from the sea the majority of the workshops in the dockyard were either seriously damaged or totally destroyed. The entrance gates to the dockyard basin, the wharf, the submarine shelter and a destroyer under repair were badly damaged. It appears also that several vessels were sunk. On June 4th a hostile machine was attacked by one of our Royal Naval Air Service pilots from Dunkirk 15 miles out at sea and driven down in a vertical nose-dive into the sea. During the night of June 4th–5th a successful bombing raid was carried out on the hostile shipping in the harbour of Bruges. A big explosion was observed and many smaller ones. This was followed by another raid on the same objective at daybreak. In all many tons of bombs were dropped. A hostile kite balloon was shot down by one of our machines.

"In every case all our machines returned safely."

June 7th.

"An attack was carried out yesterday, June 6th, by a squadron of naval aeroplanes on the enemy aerodrome at Nieuwmunster (about fifteen miles S.S.W. of Blankenberghe). A number of bombs were dropped, one big shed being hit, and several bombs falling close to two machines on the aerodrome. On the return journey the bombing machines were attacked by four hostile aircraft, which were driven off. All our machines returned safely."

June 8th.

"On the evening of the 6th inst. naval aeroplanes attacked two enemy machines 3 miles north-east of Dixmude. Both the enemy machines went down completely out of control. Another Royal Naval Air Service pilot attacked and shot down out of control an enemy aircraft 5 miles north-east of Dixmude."

June 9th.

"A bomb raid on the St. Denis Westrem Aerodrome was successfully carried out to-day by the Royal Naval Air Service. All our pilots and machines returned safely."

June 10th.

"Vice-Admiral, Dover, reports that the latest reconnaissance of Ostend shows that all large shipping has been removed from that harbour. The two destroyers lately reported as being towed to Zeebrugge are probably those damaged during the bombardment, which have been removed from the basin. The harbour presents a deserted appearance."

June 11th.

"Vice-Admiral, Dover, reports that at about 5 a.m. to-day one of his Majesty's drifters, 'I.F.S.' (Lieut. H. B. Bell-Irving, R.N.V.R., in command), whilst on patrol duty, encountered a group of five enemy seaplanes and engaged them. One machine was destroyed, the pilot being rescued by another enemy machine. This machine was in turn attacked by the drifter, and both pilots were taken prisoners, the machine being so badly damaged that it sank while being towed into harbour. The remaining three enemy seaplanes made good their escape."

Casualties.

Lieutenant FRANK LESLIE CARTER, East Surrey Regiment, attached R.F.C. (reported missing on April 22nd, since reported killed on that date), was 21 years of age, and was for some years a member of the choir of the Chapel Royal, St. James's. He was educated at Hurstpierpoint College, Sussex, and immediately upon the outbreak of war he joined the Universities and Public Schools Corps, and afterwards entered Sandhurst. He received his commission in the East Surrey Regiment in April, 1915, and in the following July went to France, but was wounded soon after going into the trenches. In August, 1916, he transferred to the Royal Flying Corps, obtaining his wings in November, in which month he married. In the subsequent month he went to France, where he did excellent work, gaining his second star in March; he was killed in an aerial engagement with the enemy.

Second Lieutenant ALICK THOMAS BENTALL CHARLESWORTH, R.F.C., killed on May 30th, was the only son of Mr. and Mrs. A. L. T. Charlesworth, of Victoria, B.C., and was born in 1893 and educated at Christ's Hospital, where he was a member of the Cadet Corps. Leaving school in 1909, he went to British Columbia and joined his father in fruit farming. On the outbreak of war he enlisted in the Canadian contingent, and soon became corporal. He received his commission in the R.F.C. last March, and had been in much of the heavy fighting at the front.

Captain WALTER LLEWELLYN CLARK, R.F.C., killed in action, was the only son of the late Mr. Walter Clark and Mrs. Clark, of Douglas, The Grove, Finchley. He was educated at Northcote, Winchester, and was a silver medalist of the Royal Academy. Joining the Artists' Rifles at the outbreak of war, he was gazetted to the Middlesex Regiment in December, 1914. Subsequently he was transferred to the R.F.C., and obtained his pilot's certificate in February, 1916. He was promoted to Captain in November, 1916.

Flight Sub-Lieutenant OLIVER BERNARD ELLIS, R.N., second son of Mr. Bernard Ellis, of Avenue Road, Leicester, was reported "missing" on May 20th, but information has been received which leaves little doubt that he was killed in an encounter with a superior force of German aeroplanes over the German lines. Sub-Lieutenant Ellis, who was not yet 19, was educated at the schools of the Society of Friends at Sidcot, Somerset, and Bootham, Yorks. He joined the Royal Naval Air Service in June, 1916, and was sent on active service last March. He was an undergraduate of St. John's College, Cambridge, but had not taken up residence there.

Lieut.-Colonel WILLIAM ALBERT DE COURCY KING, D.S.O., killed, was born in 1874, and joined the Royal Engineers as second lieutenant in 1894. He got his captaincy ten years later, and was raised to his present rank in September of last year. For some time he was employed on surveying duty on the Gold Coast, and from 1906 to 1910 acted as instructor at the school of ballooning. He took part in the South African war, getting at its conclusion the Queen's medal with three clasps. For his work in the present campaign he had received mention in despatches, and was awarded the D.S.O.

Lieutenant PETER SMITH, R.E., attached R.F.C., killed on April 28th, was the youngest son of the late B. H. Smith and of Mrs. Berthold Smith, of 27, The Boltons. He was born in 1894, and was educated at Summerfields, near Oxford, at Winchester, and at Trinity College, Cambridge. He was in his second year at Cambridge when war broke out, and joined at once, going to the front at the end of December, 1914, since when he had had only seven weeks' leave. Mr. Smith had been mentioned in despatches. His elder brother was killed in action on November 24th, 1915.

Lieutenant CHARLES HEWART VANE-TEMPEST, great grandson of Charles, third Marquess of Londonderry, and younger son of the late Charles Henry Vane-Tempest and Florence Mary, his wife, now Mrs. Nigel Harrison, of Wellington House, Norton, Stockton-on-Tees, was reported "missing" on March 25th last. He was born on May 5th, 1896, and educated at the Rev. Herbert Bull's, Westgate-on-Sea, and at Eton. He played for the school at Lord's against Harrow in 1914. Instead of returning to Eton, although only just 18, he joined his local Territorial battalion of the Durham Light Infantry. Being unable to go to the front when they went, on account of his age, he joined the R.F.C. in October, 1916, and speedily became a most proficient officer, obtaining his "wings" in January, 1917. On February 7th, 1917, he went to the front, and on May 30th news reached his family that he had died of wounds at Ligny in a German camp, a few hours after being taken prisoner.

Captain HUGH TOMLINSON, M.C., R.F.C., who died in a German field hospital on April 2nd, was the youngest son of G. W. Tomlinson, F.S.A., of Woodfield, Huddersfield, and of Mrs. Tomlinson, of 65, Iverna Court, Kensington. Educated at Lockers Park and Charterhouse, he went out to Java, where he had a tea plantation. War was declared while he was on his way home, and two days after landing he enlisted, but was rejected by the medical board. He then joined the Red Cross as a motor ambulance driver, being attached to the French Red Cross, and served in France for six months. In November, 1915, after a course at Hendon, he was gazetted to the R.F.C., and later he was put on the night defence of London and went up during several Zeppelin raids. During the raid on January 31st, 1916, he met with a bad accident. He had a second serious accident in May, 1916. Captain Tomlinson received the Military Cross in June, 1916, and was mentioned in despatches in January, 1917, when serving in France.

Flight Sub-Lieutenant DAVID ALAN DUNCAN, R.N.A.S., who was instantaneously killed through an accident whilst flying in the course of his duties on June 2nd, at the age of 21, was born at Valparaiso, and was educated at Charterhouse, Trinity College, Cambridge, and Sandhurst. He entered the cavalry in 1915, and subsequently joined the R.N.A.S.

Second Lieutenant RONALD BASKERVILLE HUGHES, R.F.C., who was killed while flying in England on May 31st, was the youngest son of the late Thomas Hughes and Mrs. Hughes, of Abbey House, Cobridge. He joined the Artists' Rifles last February and shortly afterwards transferred to the R.F.C. Cadet School at Reading, and was gazetted on April 20th. He was 18 years of age.

Mr. PERCY OGDEN, who died at the Military Hospital, Shorncliffe, on June 8th, after a few days' illness, was in his 42nd year, and was a lieutenant in the R.F.C. He was the son of the late Mr. Thomas Ogden, founder of Ogden's, Ltd., which in 1902 became a branch of the Imperial Tobacco Co. (of Great Britain and Ireland, Ltd.). He was a director of the latter company, and of late years he had undertaken charge of its manufacturing operations in this country.

Second Lieutenant ROLAND VAUGHAN WILLIAMS, R.F.C., who was accidentally killed while flying in France on June 5th, was the eldest son of Mr. and Mrs. A. H. Williams, of St. Merevyn, Flodden Road, Camberwell, S.E., and was in his 19th year. He was educated at St. Paul's School, and was articled to his father, a solicitor, of Camberwell. He joined the Artists' Rifles in September, 1915. A year later he transferred to the R.F.C., and quickly gained his pilot's wings. He was killed within a week of reaching the front.

Married and to be Married.

The marriage arranged between Captain M. T. BAINES, R.F.C., and Miss FLORA ALLATINI, of 18, Holland Park, W., will take place at St. George's, Hanover Square, to-day (June 14th) at 2.30 p.m.

At St. Mary Abbot's, Kensington, on June 6th, the marriage took place of MARJORIE, younger daughter of Sir FRANCIS BLAKE, Bt., M.P., of Tillmouth Park, Cornhill-on-Tweed, and Old Court Mansions, Kensington, to Captain R. N. F. MILLS, R.F.C., younger son of Mr. and Mrs. Mills, of Tapton Grove, Derbyshire.

On June 3rd, at St. Mary's, The Boltons, EMILE CASALIS DE PURY, R.F.A. and R.F.C., only son of Lieut.-Colonel and Mrs. Casalis de Pury, of the South African Ambulance at Cannes, France, was married to SUZANNE HONOR MAJOLIER, youngest daughter of the late Edouard Majolier and Mrs.

Majolier, of Congéniès (Gard), France, and 20, Bramham Gardens, S.W.

The marriage took place at Holy Trinity, Sloane Square, on June 5th, of Lieutenant HILTON PHILIPSON (Scots Guards), and Mrs. STANLEY RHODES (Miss Mabel Russell). The bride was given away by her brother, Lieutenant W. J. Russell-Sheppard, R.F.C.

Items.

A memorial service for Captain BALL, V.C., D.S.O., M.C., was held at St. Mary's Church, Nottingham, on June 10th. The congregation included Alderman Ball, Captain Ball's father, and his only brother, Lieutenant Cyril Ball, who is also in the Flying Corps. The Flying Service was represented by Captain Henderson, Sir David Henderson's son, and a large contingent of officers and men. The Mayor and Corporation attended in state, and the Bishop of Southwell delivered a eulogy of Captain Ball.

A remarkable series of honours in the war has been gained by sons of Mr. Edmund Portal, of Eddington House, Hungerford, formerly Master of the Craven Hounds, and a member of an old Northampton family. Mr. Portal has six sons at present serving, and of these three, Major J. L. PORTAL (Oxford and Bucks Light Infantry), Flight-Commander F. C. PORTAL, and Lieutenant R. H. PORTAL, R.N., has each gained the D.S.O.; while Flight-Commander PORTAL has, in addition, been awarded the Military Cross. The other sons are Captain G. E. PORTAL (Berks Yeomanry), Lieutenant H. N. PORTAL (Royal Field Artillery), and Chief Cadet Captain PORTAL, who is still at Osborne.

His Majesty has authorised Captain Sir JOHN COURTOWN EDWARD SHELLY, Bt., of the Scots Guards, and the Hon. Lady SHELLEY, sister of the late Hon. C. S. Rolls, in compliance with a clause contained in the will of the late Lord Llangattock, to add the surname of Rolls after that of Shelley, and to bear the arms of Rolls quarterly with those of Shelley. Lady Shelley is the only surviving child of the first Lord Llangattock, and sister of the last peer of the title, who was killed in action in 1916. She was married to Sir John C. E. Shelley in 1898.

Mr. P. C. STACPOOLE-O'LONGAN, R.F.C., to whose inclination to verse we referred to a few weeks back, is this week officially reported missing.

AVIATION IN PARLIAMENT.

Daylight Air Raids.

MR. PEMBERTON BILLING, in the House of Commons on June 5th, asked the Prime Minister whether the Government is prepared to make a statement to the reassurance of the public as to the prevention of daylight raids by enemy aeroplanes by the adoption of a policy of reprisals on the principle of two bombs for one on enemy towns of equal military significance to those recently raided by the enemy in this country; also, if he will consider the standardisation throughout the United Kingdom of a system of warning both for day and night raids; whether he will reconsider the Government's decision to refuse compensation to the people of this country who have become victims of our inadequate air defences; whether he will appoint a Commander-in-Chief to be in sole and absolute control of the air defences of this country, or, alternatively, whether he will request the Admiralty to instruct the Vice-Admiral Commanding Dover Patrol to prevent the concentration in Flanders of enemy aeroplane raiding squadrons by employing the facilities at his disposal in the squadrons of the R.N.A.S. in Flanders under his command; and whether, failing the adoption of some or all of these expedients, he will instruct the competent military authorities to make arrangements for the immediate evacuation of the entire civil population of all the towns on the East and South-East Coasts within striking distance of the known enemy aeroplane concentration bases in Flanders.

Mr. Bonar Law: Many places in the occupation of the enemy of at least equal military importance to the towns recently raided are constantly bombed by our air forces. Zeebrugge alone was raided on twenty-four separate occasions in April and May, when over 1,000 bombs, containing 30 tons of explosives, were dropped; the system of warning for day and night raids is being improved; the reply to the third part of the question is in the negative. As regards the fourth part, the Commander-in-Chief, Home Forces, is in control of the air defences of the country; in these circumstances the Government is not prepared to adopt the suggestion contained in the last part of the question.

Mr. Billing: May I ask is it the intention to use the principle of reprisal raids when the enemy raids towns of no military importance and kills people in this country?

Mr. Bonar Law: It is the intention to use our air forces in the way in which it is considered they may inflict the greatest amount of damage on the enemy.

Mr. Billing: Are you prepared to consider the question of compensation for poor people who have been injured and whose property has been destroyed owing to inadequate air service?

Mr. Bonar Law: That question has been discussed many times.

Mr. Billing: Is the Government prepared to consider it?

Mr. G. Faber: This question of the air defences being insufficient, may I ask the right hon. gentleman whether he is aware that it is the fact that the German aeroplanes coming in the daylight come at something like 12,000 ft. in height, and that they come singly and concentrate when they arrive here, and that it is extraordinarily difficult to prevent them?

Mr. Bonar Law: I am sure the House fully realises the point raised by my hon. friend. The Government and the War Office and the Air Board have been in constant communication as to the best method of dealing with the matter.

Mr. MacVeagh: What Minister is at present in charge of the air defences?

Mr. Bonar Law: I have said that all the air defences at home are entirely under the control of the Commander-in-Chief of the Home Forces. As regards the general Air Service there is, as the House knows, an Air Board, and there is also the Army and Navy in control.

Mr. MacVeagh: I asked about a Minister of Air.

Mr. Bonar Law: I have said there is no Minister in command of the Air Forces.

Mr. Billing asked leave to move the Adjournment of the House for the purpose of discussing a definite matter of urgent public importance, namely, "the recent enemy aeroplane raids and the lack of an adequate offensive to prevent the same," but the pleasure of the House not having been signified, Mr. Speaker called on those members who supported the motion to rise in their places, and, less than forty members having accordingly risen, the House proceeded to the Business of the Day.

Aerial Civil Communications Committee.

MR. P. WHITE asked the Prime Minister whether he is aware that there is no Irishman representing Ireland on the Committee appointed to inquire into aerial civil communications after the war; whether he is aware of the possibilities presented for that purpose by Ireland's position in relation to the Atlantic routes; whether the French Government, prior to the war, maintained a regular service from Paris by aeroplane which carried the mails to Pauillac, on the west shore of the estuary of the Gironde, 27 miles from Bordeaux, whence they were transferred to the outgoing Trans-Atlantic liners; whether the aeroplanes were similarly used to convey the incoming mails landed at Pauillac to Paris; whether by this aeroplane service there was considerable gain of time for posting and delivery of letters; and whether, in order that the advantages offered by Ireland for an even greater acceleration by air of the mail services may be availed of, he will appoint an Irish representative or more than one on the Committee?

Major Baird: It is not considered that the addition to this Committee of national representatives as such of the several parts of the United Kingdom is required for the effective discharge of its duties under the terms of reference, but I can assure my hon. friend that the obvious possibilities presented by Ireland in relation to the Atlantic routes will be fully considered by the Committee.

Daylight Air Raids.

ON the motion for the adjournment, Mr. Billing said: At Question time to-day I had occasion to refer to the recent daylight aeroplane raid, and in view of the exceedingly unsatisfactory reply I received I am taking the very earliest opportunity of raising the matter. The question I asked was a very definite one, and I received something in the nature of an indefinite reply. I asked whether the Government is in a position to reassure the public, especially those who live within striking distance of the enemy aeroplane bases in Flanders, that it is taking serious steps to stop the raids which we may reasonably anticipate will be taking place with heavier than air machines in the next few months by daylight. I was told in reply that bombs had been dropped on Zeebrugge. I am very glad to hear that, and I would suggest it is about time they were. The chances of bringing down heavier-than-air machines in a daylight raid are very small. The chances of bringing them down, should they commence night attacks by aeroplanes, are practically nil. At present it would not be sound policy to bring machines and pilots who are really needed on the Western Front back to England to defend the country. But I wonder whether the Government will ever discover that the finest form of defensive operations lies in the offensive. I am perfectly confident that the country which obtains the supremacy of the air will make air war so terrible for the other country that it will not dare to challenge it.

I would not like to suggest what the feeling of this country would be if we had the repetition on a large scale of the incident—a quite small incident of the war, a mere nothing as an incident of the war, but, taken as a sign, that it might become a very serious thing—which occurred in the raid upon Folkestone last week. We will say that twelve aeroplanes took part in the raid, with the result that great destruction and devastation was occasioned.

If we had thousands of people killed in half an hour in this country by a similar bombardment, what defence could we put up? These enemy aeroplanes have their concentration bases in Flanders, and again and again I have requested the First Lord of the Admiralty to bring pressure to bear upon the Vice-Admiral Commanding the Dover Patrol to stop these concentration bases. I am not satisfied even now that the Vice-Admiral of the Dover Patrol was not aware, before that squadron left Flanders, when they were concentrating for a raid on England. Surely that is the time to strike them. Surely our own pilots are constantly flying over Flanders and bringing reports of the movements of enemy aeroplanes?

Quite apart from that, when they arrive, what do they find in this country? They find confusion worse confounded. If anyone wanted a good illustration of what we have come to in this country, look what happened this afternoon here, when the report went round that there was an air raid over London. The Terrace collected more members in a few minutes than any air debate in this House collected in hours. The Terrace was full of members gazing up to the sky. Who is in command in England at the present moment? Lord French. What was he doing? He has never specialised in defence by the air. What I want the Government to understand is that the only useful purpose they can serve by the defence of this country in this country is to reduce the Zeppelin menace, which they have done—they could not help it—and to see that a fair system of warning is in operation throughout the whole of the country that is likely to be affected. It is quite useless to introduce a system so that in Folkestone someone will ride round on a bicycle waving a flag, or in Margate, if there is a raid, someone goes down the street and blows a horn, or at Broadstairs the town crier goes round wearing a steel helmet. That sort of thing is all nonsense. If there is going to be any form of warning it must be universal, and st must be systematised. It is an open question whether warnings are advisable, but in cases where warnings have been given life has undoubtedly been saved. Surely the taxpayers and the citizens of this country have a right to claim something more than a mere warning to hide in the ground because the enemy is approaching. Surely they have a right to claim that the air offensive should be carried to the spot from whence the enemy raiders come, and which with a little intelligent anticipation and a sound policy in the past the raider would never have left to justice.

We can protect ourselves against it only by a counter-offensive. I would like my hon. friend in reply to assure me that there is some hope of such a counter-offensive taking place. I do not think that it would be giving any information to the enemy. He need not tell me the exact district in which it is proposed to do it. I should also like to know whether, for the control of the defence of England, we can have one man to whom this country can look who will have absolute responsibility for that and nothing else? Lord French, who by his statements has anticipated the landing of the enemy in this country, has the whole weight and responsibility of the movement of our defensive troops on his hands. He might have been called at 4 o'clock this afternoon from the middle of a weighty conference to defend London against an air raid. We want a capable man of aeronautical experience and training, and not too senior in age, to be immediately and absolutely responsible for initiating systems of warning for the people, the civil population, and the military, and

for giving the actual orders, and arranging a system whereby the pilots of this country will know where they stand.

I have heard that two officers were court-martialled over the last raid because they insisted on going up without orders. I ask the right hon. gentleman whether he can help me about this. The pilot does not know where he is. I have heard that it is a common thing for a C.O.B. to be away from his station when a raid occurs, and you have everybody rushing about and telephoning, asking, "Where has the raid occurred? Has anybody heard of German aeroplanes? What have we got to do?" You see naval officers ringing up the police stations to know if they have heard anything of Germans dropping bombs a few miles away. The whole thing is preposterous. The Home Office is advising the police. Somebody else is advising the Anti-Aircraft Service. Somebody else is advising the Royal Flying Corps. You have West Kent cyclists riding about in all directions over the whole country. It is turned into a sort of comic opera, and yet we wonder how these fellows get back. We ask, "What should be done?" and we are told that Lord French is in command in England. I would like to know what he did on the night of the Folkestone raid, or whether he knew anything about it until all the people were dead? I do not think he did. I think that the naval and military authorities should hand over the responsibility of the air defence of this country to some individual who would be directly responsible for the whole organisation.

I do not wish to detain the House, but I do wish these points to have the consideration of the Government, and not to be lightly dismissed.

The first point is as to our means of defence, and the carrying out of a strong offensive policy. This is going to be a large question of our undefended towns against the enemy's undefended towns, and I very much regret that we are not sufficiently bloodthirsty to want it to be the enemy's undefended towns that are to suffer. That is a point I do not want the Government to set lightly aside, on the ground of principle or of policy, or whatever it may be. We have the machines, that I know, but if the Government in their wisdom think there are better methods, I humbly submit that they will find that a strong offensive in the heart of Germany, where the moral of the people has been already shaken, will have more good effect than all the talking, and all the protests, or all the anti-air guns over so many square miles. As regards the protection which the Government proposes to give this country by way of warning the people that they are to hide when the German raiders are coming, I ask that the whole of the defence should be placed in the hands of one man only. If the system is as rotten and inadequate as it has been in the past, at least we shall get the one man directly responsible. So far as compensation is concerned, I do not think that anything I can say will help the Government at all. Deputations from all over the country have been received, and a deaf ear has been turned to them, while the Chancellor of the Exchequer, as managing-director of our national insurance, refuses to accept the liabilities which he has cheerfully incurred by way of taxation. I have nothing to say to that at all, however, but perhaps the number of casualties will become greater, and then the question will receive more serious consideration. I sincerely hope it will. I do not see the representative of the Admiralty in his place, and there are only a few faithful members interested in the defence of the country sufficiently to keep them here to-night, but another question to which I should have liked to call the attention of the representative of the Admiralty, if he had been here, is whether it would not be possible to have one person commanding at Dunkirk, giving him a free hand to locate and destroy any enemy squadrons which attempted to mobilise for the purpose of initiating a raid on England within 40 or 50 miles of Dunkirk. We could hold him responsible for any squadrons which sought to initiate raids within that area, and the more we can drive them back the better it will be for this country—so far as these raids are concerned. In conclusion, I repeat to this House that, in my opinion, if the situation continues as it is to-day, this war will never be won on land, will never be won on the sea, and will never be won under the sea. If this war is yet to be won it will be by the nation which seriously takes the new weapon which has been delivered into its hands, and is able to strike the greatest offensive that, considering the low moral condition of different countries in this war to-day—would have the most extraordinary and the most beneficial effect to that particular country, when it comes to the terms of peace.

Mr. R. McNeill: The hon. member who has just sat down has twice, in the course of his speech, commented upon the paucity of the attendance, and the few members sufficiently interested in the air defence of the country to be present at this debate. I hope that the hon. member will not be offended when I say that, in my opinion, probably the paucity of the attendance is due to the fact that there are possibly few members of the House who take quite the same view of the hon. member's qualifications for giving it advice. I have listened to his speech and to previous speeches of his on the subject, and I confess that I am very sceptical on that point. I noticed that he said on one occasion, with some emphasis, that he advised the First Lord of the Admiralty to take a certain course—I really forget what course, though I do not know that it much matters—but my own reflection at the time was, on hearing the hon. member, that I myself should begin to feel exceedingly nervous as to the safety of this country if the First Lord of the Admiralty really acted on the hon. member's advice. My own reason for rising is not to discuss the hon. member or his advice as to how the war ought to be ended, though it may, of course, have some value, or may not, nor to discuss the advice he has given to the Government with regard to their defence. Whether he is qualified to give that advice I really do not know. I am not in any way an expert on the subject. The only reason why I rise is that, in the absence of the hon. and gallant member for Hythe (Sir P. Sassoon), I am, in a sense, doubly representing the people who suffered from this air raid to which the hon. member has referred. I want to tell the House that I had been in close communication with the local authorities and other persons in that locality and they are not in the least panicstricken; they have not in the least lost their heads; and they are not at all inclined to make an unreasonable demand upon the Government.

Mr. Billing: I should like to point out to the hon. gentleman that, so far from suggesting that any panic existed amongst the people, the suggestion I made was that each town is now adopting its own method of warning. In some they do so by ringing bells.

Mr. McNeill: I do not know why I should think I am not entitled to tell the House that these people are not panic stricken, because the hon. member did not refer to the point. I did not suggest that he did. It nevertheless is reasonable that the House should know the view of these people who have suffered, and the hon. gentleman will kindly permit me to repeat that they are not panic stricken, and are making no demands on the Government. The hon. gentleman has given us a description of the sort of warnings which he says are prevalent in East Kent. If I may say so without the use of many words, his description is sheer nonsense, as nothing of the kind occurs, and the idea of a town crier going about ringing bells is a thing that does not occur. At the same time I should like to tell the Under-Secretary that I think there is a case for improvement in the methods of warning, and although I am not going now to put any criticisms before my hon. friend, or ask him for any assurances, I should like to tell him that there is a certain amount of dissatisfaction in Folkestone and the neighbourhood, and that there is, at all events, an interrogative state of mind existing there, and anxiety to know whether the best that can be done is being done, and a desire to put before the Government certain points on which the people feel doubtful as to whether an improvement could not be effected. I hope within the next few days to be able to bring some of the leading people from that neighbourhood into communication with a member of the Government. I do not know if the hon. gentleman who has just spoken thinks I should have been better advised to have requested him to receive the deputation, in order that we might have the benefit of his advice before going to the Government.

Mr. Billing rose——

Mr. McNeill: As the time is short, I am afraid I cannot give way.

Mr. Billing: Then why occupy the time in making remarks intended to be funny?

Mr. McNeill: Perhaps I may be allowed to be my own judge of that. I only wish to tell the hon. gentleman opposite that I hope to have the opportunity of entering into closer relations on the subject, and I think that is the reasonable way of doing it, and the better way of doing it than levelling criticisms on the spur of the moment, until the facts are more fully known either to myself or the hon. member. When that time comes, I hope that he and those with whom he is associated will be ready to give a patient hearing and be willing to admit that, however effective they may think the arrangements are in several respects, there is very considerable room for improvement, and we hope that that improvement will be effected.

The Under-Secretary of State for War (Mr. Macpherson): I think that nothing could have been fairer than the statement of the case for the inhabitants of Folkestone which has been made by Mr. McNeill. He has not exaggerated the case, and he has told us that in a few days he is to represent the position by a deputation or otherwise of the inhabitants of that part of Kent with which he is associated, directly or indirectly, before the Government through its representatives. I happen to know a little about this particular raid, and I think that when that hon. member states that there is anxiety and dissatisfaction, he is giving an accurate statement of the case. To say, as the hon. member for East Herts (Mr. Billing) said, that there was "destruction and devastation," is not strictly accurate. Our sympathy goes out to the homes of the stricken and to the friends of those who have been lost, but when the hon. member talks about destruction and devastation——

Mr. Billing expressed dissent.

Mr. Macpherson: I have taken down the hon. member's words, and he was referring very distinctly to the Folkestone raid. I think I can rely on the support of my hon. friend (Mr. McNeill) when I say that no such appalling destruction and devastation occurred in Folkestone. To call it destruction and devastation is really an exaggeration, which I am afraid my hon. friend is sometimes given to when his enthusiasm carries him away. I would like to take this opportunity of extending on the part of the Government to the inhabitants of Folkestone their sincere sympathy, and the assurance, and I have it on the very highest authority, that everything that is possible will be done, and really has been done in the past, to defend those vulnerable points on the South-East coast which are daily in danger of attack from the air. The hon. member for East Herts told us that the finest form of defensive operations lies in the offensive. I am not going through his speech as a whole, and I do not at all object that he makes it, but when he says that the finest form of defensive lies in the offensive, I would like to tell him that that is exactly what has happened. As my right hon. friend the Chancellor of the Exchequer pointed out in his reply to a question by private notice, within the last five weeks we had 24 reprisal raids upon Zeebrugge and within the last five days six raids on Zeebrugge in the way of reprisal.

Mr. Billing: Are we to understand that in the event of the Germans stopping their raids in this country, we shall stop raids on Zeebrugge?

Mr. Macpherson: Not at all.

Mr. Billing: Then they are not reprisals.

Mr. Macpherson: I am only trying to point out in my own quiet way that my hon. friend was really contradicting himself. We have at the present time the most gallant men in the world flying, with really magnificent machines, who are doing work of which we can hardly estimate the value in this country, and are inflicting on the Germans almost daily "Folkestone raids," which are really doing as much to break down the morale of the people of Germany as any part of our fighting forces could possibly do. It is all very well for my hon. friend to stand up in this House and ask why we are not ready to meet an attack, and to draw a vivid picture of these aeroplanes concentrating in a certain part of Flanders, while in another part of his speech he says that there were only ten or a dozen aeroplanes. My hon. friend knows perfectly well that it does not require a concentration of ten or a dozen aeroplanes, for that is the normal number of aeroplanes which one may find in any given station either in Flanders or Germany or this country. Consequently the drawing of this picture, for the purpose of his argument, of the assembling of these in a certain part of Flanders for attack is really asking the House to believe too much. While my hon. friend was talking about what these aeroplanes were doing, our own aeroplanes were doing quite as well at the same time at another place.

My hon. friend asks if I can give him an assurance that the defence of these shores is in competent hands. I can assure him that the Government is satisfied with the competence of those who have charge of this matter. He attempted to belittle the value of my noble friend's services, and proceeded to ask what knowledge he had of aeronautics. As a matter of fact, it is not absolutely necessary for the officer in chief command of Home defences to be a specialist in every branch of Army work. If it were, it would be impossible to get any Commander-in-Chief of the Home Forces. What my hon. friend apparently desires is to have a perfect paragon of all the military virtues. Everybody is satisfied, except perhaps my hon. friend, with Lord French, who is one of the most distinguished of living generals. He takes a deep, personal interest in this particular work, and has got around him a most competent staff, some of whom are exceedingly expert in this particular branch of the Service. Not only has he got his own staff, but his staff is in the closest co-operation with the Admiralty staff, and with the various staffs in the various commands throughout the country. I am perfectly satisfied that the country has a great deal of confidence in Lord French, the Commander-in-Chief of the Home Forces. I do not know what justification my hon. friend had for the statement as to the court-martial in connection with the Folkestone raid.

Mr. Billing: I only asked the question.

Mr. Macpherson: Very often questions are asked without sufficient inquiries being made, which means that the question is merely a statement put in the form of a question. I do not think my hon. friend has any justification for asking his question or for suggesting that a court-martial has taken place. The implication is that these two gallant officers were court-martialled either for neglect of duty or cowardice.

Mr. Billing: No.

Mr. Macpherson: Then what was it?

Mr. Billing: I understand from the information I have that these two officers requested permission to go up when the enemy was sighted, and that they could not get that permission. There was a considerable amount of dissatisfaction, and that they were put under arrest for insubordination. They were, it is said, only too anxious to fight.

Mr. Macpherson: The two officers asked to be allowed to fight the enemy and were not allowed to do so?

Mr. Billing: Yes.

Mr. Macpherson: I do not know on what basis the question was framed, but it seems to me highly improbable that anything of the kind happened. However, my hon. friend has asked me to make inquiries, and I will do so. In regard to the question of compensation, it really, perhaps, did not arise out of

the question asked by my hon. friend this afternoon. But my hon. friend probably knows that the Government instituted a very cheap and reasonable insurance scheme. For a small payment anyone can have their property insured against any damage by hostile aeroplanes. I have made no attempt to follow my hon. friend into his matters of strategy or military history, or the various personal events to which he has referred, but I hope that I have answered every single point which really did arise in the questions asked by him. I would impress upon him if I might, to be more careful in making his statements, which he may make in perfectly good faith, but which really—as in the case of such statements that there was "destruction and devastation at Folkestone," and that these two gallant officers were court-martialled—are not calculated to do any great good.

Kenley Common as R.F.C. Acceptance Park.

SIR F. BANBURY, on June 6th, asked the Under-Secretary of State for War whether he is aware that Kenley Common, one of the open spaces which the Corporation of the City of London is under a statutory obligation to maintain for the use of the public for ever, and occupying an area of about 81 acres, has been taken possession of by the military, who are cutting down the trees, some of which are 80 years old; whether he is aware that there is a larger common in the neighbourhood, Farthing Down occupying an area of 121 acres, which is more suitable, and whether he will stop the destruction of the trees until the other site has been considered?

Mr. Macpherson: It has been decided to take over Kenley Common as an acceptance park for the Royal Flying Corps and as an aerodrome for the purpose of assisting against hostile daylight raids. The common has been examined by many skilled pilots, who all came to the conclusion that there was no place near at hand or near London so eminently fitted for these purposes. The alternative site suggested by my right hon. friend was also examined in the hope that, if it proved suitable, there would be no necessity to deprive Kenley Common of its trees, but the conclusion was come to that it was entirely unsuitable for the purposes named and that, owing to its natural formation, no human skill could make it suitable. There is no intention of erecting any buildings on the common, and my information is that such trees as are being cut down are, in the main, not old trees. I regret that even these should have to be cut down or that the natural amenities of this public ground should be in any way injured; but I am informed that this had to be done on the grounds of urgent national necessity. I should point out that this common has a main road right up to the aerodrome, and is served by three railway stations. These have facilities for unloading machines, which in the case of an acceptance park are delivered by road and rail in pieces from the contractors, and that it has the additional advantage of having a main water supply and electric-feed cables within close range. I regret, therefore, that the work must proceed.

Sir F. Banbury: Is my hon. friend aware that no notice whatever was given to the Corporation of the intention of the military to occupy this space, and that when the Corporation found this out, through their keepers, the military official merely curtly said that he was going to do what he liked under the Defence of the Realm Act, and did not care for anybody; and whether, under those circumstances, it is not just that the Corporation, who have no desire whatever to interfere with the devotion of proper space for an aerodrome, should be heard as to whether or not the other site is not a more suitable one?

Mr. Macpherson: I am sorry if the Corporation feel aggrieved by non-attention to the politenesses of life; but I feel assured that my right hon. friend will admit that they are not often omitted by officers of the Royal Flying Corps. When the right hon. gentleman says that no notice was given by them, I am loth to believe that on none of those occasions did they apprise the Corporation or the keepers that they intended to make the examination. I have had this morning an opportunity of going into the whole of the facts of the case, and, as I said in my answer, we deeply regret having to take any public ground, but this matter, being one of extreme urgency, necessitated our taking the space. I can only again express my regret.

Sir F. Banbury: I beg to give notice that I shall call attention to this subject on the motion for the Adjournment.

Mr. Morton: Was notice given to the Town Clerk of the City of London before they took possession of this common?

Mr. Macpherson: I cannot say. My attention was not directed to that particular point, but I will make inquiry.

Air Patrols and Enemy Raids.

CAPT. BURGOYNE, on June 7th, asked the Parliamentary Representative of the Air Board—(1) whether there is any constant air patrol along the East Coast; if so, whether there is any explanation as to why the recent raid which took place in full daylight was not dealt with before reaching Folkestone; (2) why, although many seaplanes lay ready for instant service in Dover Harbour, no orders were given to the pilots until twenty minutes after the hostile machines employed in the recent German air raid had gone over?

The Parliamentary Secretary to the Admiralty (Dr. Macnamara): These questions deal with matters within the purview of the Admiralty. I have therefore been asked to take them. If my hon. and gallant friend will place himself in communication with either the Fifth Sea Lord or myself, we shall be glad to give him all the detailed information upon the points which he raises.

Capt. Burgoye asked the Parliamentary Representative of the Air Board whether the watching of the Kent coast is largely vested in men drawn from infantry battalions quartered in the several districts; whether these men have the slightest knowledge of detail distinctions between British and hostile aircraft; and what provision is given them to spot aircraft passing over at heights up to 20,000 ft.

Mr. Macpherson: The information asked for in all three parts of the question cannot be given publicly.

Capt. Burgoyne asked whether the hostile aircraft employed during the recent raid were observed passing over certain parts of Essex; and, if so, why, in the circumstances, no warning whatever was sent out to Dover and Folkestone when it must have been known that these, amongst other towns, were their objective?

Mr. Macpherson: It would not be in the public interest to discuss the system of warning; but my hon. and gallant friend must not assume that Dover and Folkestone were the actual objectives of the raid.

Names of Places Attacked.

CAPT. BURGOYNE asked the Prime Minister who was responsible, and what were the reasons, for forbidding publication of the names of the towns recently attacked by hostile aircraft; and, in view of the subsequent change of policy, what action he proposes to take in the matter?

Mr. Macpherson: My right hon. friend has requested me to answer this question. For various reasons the name of the town was withheld until the publication of the enemy's *communiqué* showed that there was no longer any necessity for secrecy.

Emergency Rations for Air Services.

MR. BILLING asked the First Lord of the Admiralty what arrangements, if any, are made to supply pilots of seaplanes and all airmen bound on long-distance oversea flights with emergency rations and with facilities for obtaining drinking water when flying in machines with air-cooled motors or for tapping the radiator for drinking water in machines with water-cooled motors?

Dr. Macnamara: Emergency rations, consisting of malted milk, Bovril, and chocolate are supplied to Royal Naval air stations for the use of pilots of seaplanes and airmen engaged in oversea flights. Drinking facilities are provided for by the issue of Thermos flasks. No facilities have been provided for tapping the radiators of water-cooled motors, the contents of which are more likely to act medicinally than otherwise.

West Common, Lincoln.

MR. C. ROBERTS asked the Under-Secretary of State for War whether his attention has been drawn to the dealings of the military authorities with the West Common, Lincoln; whether he is aware that the Lincoln Corporation gave their consent to the erection of aeroplane sheds on this common on the distinct understanding that the sheds should be removed at the end of the war; and whether the War Office have any intention of departing from that understanding?

Mr. Macpherson: Under the Defence of the Realm (Acquisition of Land) Act, 1916, the War Department is precluded from continuing in possession of common land for an indefinite period after the war, and my hon. friend may rest assured that there will be no undue delay in the removal of the sheds; but I am afraid it is impossible for the Department to give any definite undertaking, as that might hamper their action in exigencies which cannot at present be foreseen.

Conduct of Officers.

GENERAL CROFT asked the Under-Secretary of State for War (1) whether in the recent case of arrest of officers at Leybourne Camp, these officers were placed under arrest pending further instructions; whether any investigation took place; whether they were put under arrest for any definite charge; whether the charge was later entered as disobedience of orders; and whether in fact the order which these officers were presumed to have disobeyed had ever been conveyed to these officers; and (2) whether, on the occasion of the recent air raid, certain officers at Leybourne Camp were placed under arrest; if he will state on what charge these officers were arrested; and whether these officers are still under arrest?

Mr. Billing asked whether one or more officers of the Royal Flying Corps, or any other corps, have been court-martialled at Shorncliffe or elsewhere in connection with the recent enemy aeroplane raid on the South-Eastern counties; if so, for what reason was this court-martial held; and what was the finding of the court?

Mr. Macpherson: I have not received any information as to the matters suggested in the question, but I will make enquiries.

Warnings of Air Raids.

CAPT. BENNETT-GOLDNEY asked the Under-Secretary of State for War at what time of the day the first notification was received in London at the Horse Guards, or other office concerned, during the recent daylight raid in the Folkestone area that the enemy machines had been seen on their way to this country and had actually arrived from overseas upon their destructive mission, respectively; and if he will state at what time any warning was sent either to the military or civil authorities of the area either that a raid was to be expected or that our own machines and guns should be in readiness for a possible attack?

Mr. Macpherson: The information asked for would disclose to the enemy the measures taken in this country for defence against aerial attack, which it is most undesirable should be made public.

Capt. Bennett-Goldney asked whether, during the recent raid on Folkestone and the neighbourhood, any British aeroplanes or seaplanes capable of rising to a similar altitude as that at which the German machines were flying were and are held in readiness for ascent and fighting within the area; and whether any orders were sent through to any flying stations within the area that any such machines should take the air in readiness for defence or attack before the appearance of the enemy?

Mr. Macpherson: The answer to both parts of the question is in the affirmative.

Capt. Bennett-Goldney asked whether in connection with the recent raid in the Folkestone area, any warning at all was sent, either to the military or civil authorities of the area or of the Canterbury or the Ashford area, that enemy machines had arrived, or were about to arrive, over the Eastern or South-Eastern coasts; whether air defence of any kind was either available, or, if available, utilised against these particular raiders within the area attacked; and who or what authority was responsible for the neglect to provide any adequate and efficient defences against such a raid in this area?

Mr. Macpherson: Air defence of various kinds was both available and utilised. It would not be in the public interest to discuss the extent of the defences or the system of warning.

Orders for Attacking Aircraft.

CAPT. BENNETT-GOLDNEY asked whether some fifteen minutes after the German machines concerned in the recent raid in the Folkestone area had left our shores an order from London or elsewhere that certain of our own machines should take the air was sent to any of the flying centres within the area; whether machines suitable for actual defence were known to be in readiness in this area; whether it was only after such an order had been received that any of our own machines did go up in pursuit; whether the machines then sent up were of such a type as to be capable of climbing swiftly to an altitude of 14,000 or 15,000 feet and there meeting the German machines which came over on terms of equality; and how many of such British machines did actually go up in pursuit while the enemy were near enough to be caught up before reaching the protection of their own lines?

Mr. Macpherson: There is no foundation for the allegations in the first part of the question. The answer to the second part is in the affirmative, and to the third part in the negative, and the fourth part does not arise. It is not in the public interest to give the information asked for in the last part of the question.

Anti-Aircraft Defences.

CAPT. BENNETT-GOLDNEY asked how many, or whether any, anti-aircraft guns, exclusive of any at Dover, were in use in the area affected or its immediate neighbourhood during the recent raid in the Folkestone area; whether all or any of these guns, if any, had a sufficient range to reach to a height of 14,000 or 15,000 feet; and, if so, how it was that the shells which were seen from Folkestone to be fired after the machines had left appeared to burst at a very much lower altitude?

Mr. Macpherson: Information as to the numbers, disposition, and efficiency of the guns available for anti-aircraft defence would be exceedingly valuable to the enemy, and cannot, therefore, be made public.

Accidents.

Mr. BILLING asked the Under-Secretary of State for War how many accidents, fatal or otherwise, have occurred on R.E. 8 machines flying in this country since the introduction of this type?

Major Baird: I regret that I am unable to supply the figures for which the hon. member asks. They would be entirely misleading unless they were accompanied by a statement of the number of machines of this type in use, and of the pilots who fly them, which it would be against the public interest to give.

Mr. Billing asked what type of aeroplane 2nd Lieut. Cyril Harvey Trollope was flying when he was killed at Doncaster on May 4th; and also what type of machine Lieut. Fletcher was flying when he was killed in this country last month?

Major Baird: Both the casualties referred to occurred on an R.E.8 machine.

FLIGHT

"LOOKING AHEAD."

By Lieut.-Col. MERVYN O'GORMAN, C.B.

BEING THE FIFTH WILBUR WRIGHT MEMORIAL LECTURE.*

I thank the Council for the invitation to deliver this the fourth lecture in memory of Wilbur Wright, the man of foresight who gave 12 years of his life to unrecognised toil and who is now, after a further 10 years, fully acknowledged as a far-seeing and sane experimenter. We are proud that he was a member of this the earliest of all Aeronautical Societies of the world, and we hope to carry to yet greater things the consequences of his great achievement. To do this we must now and then look ahead.

For nearly three years aeronautical engineers have been working under intense pressure on a multiplicity of details of design and production. Many have thereby been forced away from their normal wide outlook and habit of detached thinking—unless fumbling for a 'bus fare be a mode of thought. Our minds have been moving forward as strap-hangers are moved forward by the train amidst an intolerable crowd of immediate calls, while the general survey of the horizon—the trend of the past, the prospects of the future—has been obscured by the crowd.

It was General Scott Moncrieff, himself a distinguished R.E., who originated the reply "I am an engineer, not a prophet" when too searching demands were made upon him by the Army Finance Branch as to the outcome of some scheme, and there are few who have had control of engineering works on the larger scale who would not have been glad to get relief from the tax on their prescience if it could be got by borrowing this dictum. Every estimate, tender, specification, contract is such a tax; every design, preliminary experiment, tool, and gig equipment for output is an expression of the effort to foresee the position some six or twelve months ahead. We are now, however, seeking an outlook on a wider gap than this, so let us step back to spring clear.

Aeronautical engineers have lived for many years on a diet of hope, exercising their imagination and stimulating others to look ahead; hence they can realise with exceptional clarity how foresight may become dormant in busy men and so be led back to ask themselves, "Now that we are busy, are we as wide awake as we were?" "Do we now pause to look 10 years ahead as we used to do?" I believe that until Mr. Holt Thomas's lecture the answer from the aeronautical world at large was "No."

Of course, our aeronautical world includes both the Air Services and also financial persons as well as civil engineers.

In the Services the routine of life calls mainly for the very different mental effort of *rapid decision*. Yet this is not a diametrical opposite, for these decisions will be unsound if there has not been thinking in anticipation, and in war we see how the higher commands are pitched into the "foreseeing business." The military organiser must be among the prophets and not least in the matter of the purchases to determine on.

The financier should be *par excellence* a seer. He deals in credit and in confidence. He should be clear-sighted enough to know when to take a risk. Those who think he would be more useful if he were gullible are deeply wrong; that would be disastrous. What we wanted both from him and from the purchaser in the days of our struggles was foresight. The proof that it was lacking is that aeronautics unquestionably found money and orders too hard to get in the past. This, on the one hand, arose from the fact (which has in other ways been of priceless service to us in the war) that our banks are mainly engaged in *deposit banking*, rather than in taking part share in developing newly-fledged industries, after the style of the industrial banks abroad; while, on the other, the Services, who were the purchasers, were and are tied to peculiar Parliamentary adjunct.

This adjunct is another kind of financial person from that first indicated. Aeronautics, military and naval, has been and will be closely concerned with them. These are not courageous "gentlemen adventurers," to use the old phrase; they themselves would say they are the antithesis thereof. Anyhow, the country's money is not entrusted to financiers in the usual sense—a name for those who weigh a risk against a profit and take both. Rather is it in the hands of anti-spending organisms with an astonishing aptitude for evading money risk. In the wider world it is axiomatic that no progress can be made without venturing forth, but we have had no State Department instructed so to venture; indeed it is almost incompatible with the strict annual accountability exacted from Army spending departments in most democracies.

One could quote a luminous address delivered to the Staff College by Sir Charles Harris, K.C.B., the head of all Army thrift for 25 years, to show that to succeed in *not spending* is the gauge of effectiveness for such a branch, provided the Army is carried on for the year under review. In view of the object for which it is instituted he must be right. This, of course, is a different thing from financing a development.

For British aeronautics to-day carry just such an impress of primitive struggles and mistakes, and the question arises whether we can learn and whether we are now unwittingly, as we were then unwittingly, misguided by prejudices, our own and others? A point of view is prejudiced when it is held with a tenacity which is in excess of that warranted by the evidence. Let us consider some notions of the past.

Memories are so short that our instinct is to deny as a body that we delayed our own progress by early errors of our own outlook, particularly as we were so acutely conscious of and so busy combating the errors, obstinacies and prejudices of others. I can well believe that most members have forgotten the almost unanimous opposition which existed to the idea of forcing up the speed of Service aeroplanes* to the level of the "stunt" aircraft of the time as recently as 1910. Even 75 miles an hour was taboo! A little prior to that there was a fairly widespread insistence upon flying with the minimum possible engine, and one of our British pioneers so far succeeded as to achieve flight with about 10 h.p., a performance in itself a record and highly creditable.† Quite common in 1911–12 was the conviction that flying for an hour at such a height as 4,500 ft. (to-day the easy achievement of every junior with less than 20 hours' flying experience) was a monstrous test to impose.‡ You will, I think, sadly recall the wastage of small fortunes on wing-shapes which had no attraction that was even arguable except their singularity§ and the unregulated gusty enthusiams which at one time favoured all monoplanes to the exclusion of other arrangements,¶ or later still which, in order to favour bigness and twin engines began to despise the small craft,** or later yet, what may prove to be, a regrettable revulsion against big craft.

You may remember the furore for steel tubular construction (I was myself a victim); harmless it might be said in itself, but pernicious in that it was commonly accompanied by a prejudice against the use of wood. There have also been prejudices for and against the rotary engine, for and against pusher aeroplanes, for and against warving wings to the exclusion of wing flaps, &c.

It is to be noted that as opinions, zealously pursued and tested, the views in themselves were a stimulus to useful experiments, but the prejudice which was imported against the alternative courses were nearly always narrow and pernicious to our progress and the very reverse of foresight.

This brings us to the more ticklish matter of the prejudices ruling to-day.

I suggest that there is a prejudice in the matter of a low price for labour; it is also held that *destroying goods* is in the interest of trade and good for securing wages to labour. It is a common prejudice to believe that if one firm makes a splendid scientific step and thrives accordingly, that it is bad for others in the same trade British airships—the 40-hour air-scouts for the Fleet—were killed by public prejudice. There is possibly more prejudice than proof at the root of our neglect to found any hopes on soaring flight. The wind tunnel and its priceless contributions to flight have been decried from prejudice—not proof. The method of trial and error called rule of thumb has been set up as the antagonist to studied design on similar grounds. I believe every exponent of this antagonism is an opponent of progress.

There are prejudices against stability, and against the use of factors of strength in aircraft design, and against the possibility of combining controllability with stability. I am told that there are still prejudices against big aeroplanes and on the subject of the best number of engines to instal. Amongst the notable prejudices of the war is one which

* Delivered before the Aeronautical Society at the Grafton Galleries, London, W., on June 13th.

* I except Mr. Lanchester, and also claim to have escaped this one particular error. See Inst. Auto. Engrs., page 291, para. 75, "Problems Relating to Aircraft."

† Mr. A. V. Roe to whom great credit is due for this by no means uninstructive "Record."

‡ But for this error we might years ago have got clear of the main aero-carburettor problems of to-day.

§ The basic trouble here was the disregard of the wind tunnels of Eiffel, and the N.P.L. Prandtl and Riabouchinski.

¶ Notably the tractor biplane to which again Mr. A. V. Roe was the British exponent, and Buquet the French.

** This phase was worse in France than in England, but it was significant even here.

declares that German aircraft were and are better than ours on the average, class for class, and that the exceptional German aircraft was better than the exceptional British. There have been astonishing prejudices as to the efficacy of certain bomb-sights and the utility of thin armour.

There is a wide class of prejudice fostered by catch words, generally detached from their qualifying context—the "inevitable survival of the fittest" is the common example. Thus "competition is good for trade," when unqualified, is a dangerous prejudice of which I hope to give an example later. In technical studies there is a widespread prejudice against "overlapping." I regard "overlapping" as the useful free and independent study of the same subject by different intelligencies, and invite you to note that overlapping research is the root of some of the finest engineering advances in industrial life, and of the finest scientific progress, as well as one of the chief excuses for the statement that "competition is good for trade." The word "fog" is in danger of becoming a catch word for prejudice against aeronautical development.

I have been told of the existence of prejudice against gravity-controlled air-speed indicators and against a certain oval-sectioned aeroplane wire. I believe there is a prejudice against the use of instruments when teaching flying, and run the risk of being called prejudiced for saying so. There was a prejudice against the registration of private motor cars, and there is danger of one as regards aeroplanes. I am told that there are even prejudices in Parliament—that is to say, conviction in excess of proof—against particular kinds of aeroplanes. You will remember the yokel who remarked as he ground his heel into a useful little creature who could not answer back: "I'll larn ye to be a toad." I have seen similar prejudice against other unoffending workers. None of these things are good for progress. There are outside of this Society, and perhaps within it also, prejudices on the subject of vertical-rising flying machines, and I think there have been recent prejudices on the subject of dope, shock tests for steel, the use of welding, &c.

I hope that these few suggestions, even if some of them are wrong, will be taken in good part, for the sake of the moral. For if anyone, and still more if several, of these convictions were erroneous and were to be held to be certainly correct, we should be led to the definite avoidance of a particular line of construction, or performance, or study, and to the adoption of its opposite number. For a brief moment this flush of popularity would benefit the happy enthusiast whose choice was selected, even if he were mistaken, but the kink taken by British aeronautics would react to his and everybody's eventual detriment.

We may say that so long as no preponderating prejudice leads us *all together* in the same wrong direction, these prejudices only operate as the varied enthusiasms which make for the more thorough exploration of some corner of our immense field of inquiry and at the cost of some little delay give rise to a very definite new knowledge and certainty. However, it would be a grave lack of foresight not to remember that we are relying upon the mere chance that the lack of interdependence among individuals will save us. When prejudices are rife we are staking our safety on the survival of our own "cussedness"—a very slender safeguard against the "all together" tendency which every socially-united community is more and more drawn to, the more in proportion as it is more closely knit and organised.

The remedy, the insurance against this risk, is provided in the existence of the individual constructor healthily overlapping in his studies those of his friends and rivals, and in the free discussions which our Society provides, with occasions for now and then taking stock of our position, past and present, with a broad philosophic mind.

I would venture on one example now sufficiently far back in date to be quoted without raising any feeling—of a dangerous run of prejudice from which we have escaped only with pain. I allude to the time when almost the whole British aeroplane industry centred its efforts on the monoplane, when it was as possible then, as it is now, to see that the girder structure of the biplane lent to it specific advantages for at least some types of aircraft. It was a rude shock when this monomania, or monoplane mania, was brought up to a standstill. One of the evils of this is quite possibly the reaction which set in and enabled Mr. Besnard, the French Air Minister, to say lately with apparent satisfaction that he had not got a single monoplane, yet I doubt if he has seen, and certainly I have not yet heard of, any technical study which has established that this compact type of machine has not still got many useful fields.

You are probably aware that a danger nearly as great threatened French aeronautics over the big multi-engined machine as lately as within the war period. They almost stayed all other advances in favour of these large aircraft. Our industry having in each country a sole purchaser, the Government, suffers the risk of an "all together" prejudice more greatly than ever did the automobile or shipbuilding industries with their various outlets and various demands and various supplies of funds.

TABLE A.—*Internal British Aeronautics.*

The Uses of Aircraft.	*The Safety Provision.*	*Education of Personnel.*	*Production of Aircraft.*	*Labour.*
(*a*) Transit of goods. (*b*) Transit of letters. (*c*) Transit of persons. (*d*) Labour of transit service. (*e*) Finance of Transerial Coys. (*f*) Government subvention of aerial transport. (*g*) Private, sporting, and domestic use. (*h*) Scientific use, surveys, &c.	(*a*) Aerial routes and lines of landing grounds, maps. (*b*) Night flying and landing. (*c*) Aerology and meteorology. (*d*) Wireless communication of distress, orders and signals of directions. (*e*) Labour of ground upkeep, &c. (*f*) Subvention of safety precautions and grounds. (*g*) Accidents, investigation. (*h*) Keeping of records. (*i*) Insurance of — (1) pilots, (2) passengers, (3) craft.	(*a*) Designers and engineers. (*b*) Flyers and navigators. (*c*) Military call on flyers. (*d*) Polytechnic and correspondence schools for labour. (*e*) Subvention of education. (*f*) Collation of data, research. (*g*) Inventions. (*h*) Consular trade information, &c.	(*a*) Best employment of existing factory organisation. (*b*) Finance and subsidies to makers. (*c*) Military and naval requirements. (*d*) Publicity and "load curve orders." (*e*) Utilisation of overplus of military and naval war orders. (*f*) Supply of aircraft to foreign Governments and Colonies.	General Question. (*a*) Skilled and unskilled. (*b*) Male and female, including military, wounded, pensioned, &c.

Neither of these runs of prejudice actually brought the trade to a standstill, but we have herein a lesson which some of those, and they are very numerous, in socialistic centres who believe in the exclusive State control of all capital and industry might usefully take to heart.

This brings us to the great future in which the aeronautical industry will have the benefit of totally independent purchasers—commercial aeronautics. Commercial aeronautics is clearly one of the subjects to which I have alluded as requiring foresight, technical, political and financial. Broadly, the objective is simple, in detail it is very complex. This at once suggests analysis as a help towards foresight.

Commercial aeronautics can be divided into three parts:—

(*a*) The home or internal aspect.
(*b*) The foreign or international aspect.
(*c*) The Imperial and Colonial aspect.

The internal British question can be resolved into five separate subject-matters for study, and as each of these has sub-heads, I tabulate as follows, drawing attention to the two main heads—(1) the production, and (2) the utilisation (or "aerial transit") problems, corresponding roughly to supply and demand.

It is best not to discuss these heads till we have also analysed the international and Colonial questions into sub-heads.

It will be found that the profitable use of aircraft is based on speed, and that as speed of transit includes door-to-door movements, if there are, as we see at present, considerable terminal time losses, the longer the distance over which aerial work is conducted the less significant are the "terminal charges" upon our time of transit. This merit introduces, for a small country, the advisability of studying flight beyond its borders, and for an island the consideration that shipping is slow compared to the railway or motor car. Therefore international flying will come up early in our development of aerial transit, and may be expected to concern movements over the sea, not necessarily in seaplanes.

But you cannot go abroad without your tickets, your circular notes and passport, so you cannot fly over another country without making arrangements. These arrangements will be easily made if there is a body of opinion abroad which is favourable, which recognises that it will not get landing rights in British Possessions unless British aircraft have landing rights on foreign soil. One of many ways of securing such a body of opinion favourable to aerial transportation in the prize lands themselves is to institute industrial links between our own constructors and foreign constructors, whether as "succursales" or joint firms, or shareholders, or agents. I te refore put these first and tabulate five sub-heads.

If we develop our aircraft making and using properly we shall be the first to wish that other countries may be equipped with "aerial ways" (lines of landing grounds), aerodromes at big centres of industry, finance, or pleasure. Moreover, we want to find elsewhere not only the maps, but also most of the safety provisions desirable at home. All these things will be fostered by the energies of societies like the Aeronautical Society and the Society of British Aircraft Constructors, which we should like to find abroad and enter into relations with. At present they are not nearly as active abroad as at home. They might be fostered not only officially, but rather through the intermediary of our *industrially-linked firms*, whether for construction or transit.

One of the important matters for consideration is the avoidance of cut-throat competition at a time when it is always difficult to ensure a remunerative investment with any certainty. This involves the inter-State provision of what may be termed limited monopoly for certain services at least, until the businesses are well launched and till statistics exist in which insurance operations can be satisfactorily based. Firms can be trusted to make their own value felt by the Post Office and by passengers whom they desire to attract, but they are defenceless against one another if as soon as one energetic individual has initiated an enterprise the value of his strenuous work is to be poached upon by irresponsible persons (who may, it is true, ruin themselves undeplored), but who may drag into a like ruin those whose industry and courage founded the whole scheme. The Government should step in here in the interest of maintaining what it must maintain, a large successful and enterprising industry.

It may here be worth while to say why the country must do this. It is a matter of economy. The Air Fleet differs materially from the Sea Fleet in being more rapidly expendible. No one would dream of rebuilding the British Fleet six or eight times per year of war. Yet the Air Fleet requires at least this. Thus the aeroplane occupies an exciting position halfway between a battleship and a cartridge. To decide on having an Air Fleet for war is synonymous with having an aircraft industry in peace competent to produce some eight air fleets per annum when called upon.

The question "What industries are essential to the future safety of the nation, and what steps should be taken to maintain or establish them?" was set to Lord Balfour of Burleigh's Committee. The reply, though only a general one, given by the Committee certainly must be taken to include aeronautics not only as a key industry, but as an industry the growth of which is necessary to the formation of pilots and the full maintenance of their "weapons" at the abnormal rate which results from war wastage.

The Committee's reply included the following phrase:—"We consider that special steps must be taken to stimulate the production of . . . manufactured articles within the Empire wherever this expansion and production is possible and economically desirable for the safety and welfare of the Empire as a whole."

The necessity for special steps being taken to preserve and expand the production of aircraft is scarcely open to question.

When we seek for what kind of special steps are, on the one hand, likely to win the support both of Protectionist and Free Trade voters, and on the other are sanctified by precedent and analogy, we can probably find suitable stepping stones through the marsh of the old controversies. One suggestion is the subventing of specific air-carrying trades, postal and other, on terms so that on the one hand the public get something for its money and gets a supply of pilots against a war demand, and on the other hand the aircraft producer gets orders.

TABLE B.—*Foreign Aeronautics.*

The formation of Industrial Links. Co-ordinating Technical Societies.	Post Office Reciprocity. (*a*) Prices for postage. (*b*) Methods of collection and delivery. (*c*) Agreed routes.	Post-War Inter-Governmental Agreements (Allied and enemy). (*a*) Flying rights. (*b*) Landing rights. (*c*) Rule of the "road." (*d*) Supply of aircraft to foreign Governments. (*e*) International law, prohibited areas, &c.	Registration of Craft. (*a*) Salvage by ships and by aircraft. (*b*) Exchange of meteorological news.	Customs and Policeing. Quarantine and Aliens Question.

There is precedent for this in the mail-carrying business, and there are also valuable foreign precedents and analogies.

It is obvious that the exclusion of foreign aircraft from the right to alight on these shores is not compatible with our expectation or our demand for the rights of alighting on foreign soil—similarly heavy port dues or landing dues are objectionable—for if we mean to build up the biggest Air Fleet we should probably pay out to foreign Governments the biggest total of port dues even if their scale is the same as ours. It is submitted as worthy of consideration that our interest lies in the direction of the smallest possible alighting tax provided reciprocity is secured or approximated to.

This therefore points to another form in which support may be given by the Government to the industry—the relieving of alighting grounds of part of the burden of rent, maintenance, night lighting, &c.—and this can, not improbably, be achieved in such a manner as to secure for the taxpayer the direct *quid pro quo* dear to the finance branches, by providing that a certain amount of accommodation shall remain always available for service pilots.

Subvention of aeronautics need not by any means be limited to cash payments as subsidies to producers.

It is amply clear that the formation of a chain of alighting grounds from big centre to big centre, if suitably chosen, may be made so as practically to abolish the risk of forced landings—in the current sense—that such a chain of grounds must be a high source of economy in machines and men to the State which is perennially conducting its air service training and manœuvres, and that the greater our private aerial locomotion business becomes the greater is the money value of such insurances against accidents.*

How to arrange that the owner of the alighting fields shall be able to graze them, manure them, &c., at certain times, or otherwise to derive value from them without imperilling the flyers in any way, together with the institution of suitable markings, is a matter for careful study, and such study will no doubt be conducted by using to the utmost the existing organisations such as this Society and its ally, the S.B.A.C.

It is certain that an industry sufficient only to build the aircraft needed by the Services in peace time cannot possibly

* I was fortunately instrumental in bringing to this country the first record of such an aerial way in practical use in Italy, and in securing from Major Perfetti the Italian maps which our recent lecturer, Mr. Holt Thomas, used as a striking illustration of his lecture. Aerial ways from Turin to Milan, to Udine, and from Milan to Rome, down both sides of the coast form part of the scheme. Recently we learn that the Central Powers are starting a £2,000,000 scheme—Berlin, Constantinople and the East.

be large enough or "live" enough to meet the heavy depreciation of war, even at the outset, or even for a short war.

The established Army system of keeping a "mobilisation store" of goods which are for ever untouched, and are kept in readiness and up-to-date for the emergency of war, is not applicable in its simplest form to an apparatus so quickly antiquated and so rapidly perishable, even when not in use, as an aeroplane. Hence large constructional works must be kept in being, and they can only be kept going economically by being profitably employed, and this in turn demands that there shall be a full "turnover."

So soon as this is known to be decided on capital will flow into both the aircraft production industry and the aircraft transit industry from all sorts of private channels, to the great profit of the State.

One way of securing this "turnover" has been indicated in the supply for "transaerien" companies; another is the supply of craft to foreign Governments, much as we supply battleships or guns in time of peace. What we owe to this policy in the matter of shipbuilding is almost unthinkable. The business of assisting the aircraft producer to this end is one which calls for the wisest and most far-seeing policy—one step at least of this policy is in our hands.

The shortsighted and ignorant booming of German machines should be stopped now, not arbitrarily, but by the simple dictates of truth, and if for no other reason, to avoid discouraging our flyers at the front.

The Commercial and Postal Uses of Aircraft.

As we have recently had a suggestive paper on aeroplane transport, giving rough costs on a certain route, I will not dwell on it save to recall the existence of the airship and to touch on one matter which I raised in the discussion, and to what Lord Cowdray also addressed some remarks. I allude to the danger of the hiatus which might occur between the war demand and the peace demand. There appears here all the value that attaches to promptness in giving—"*bis dat qui cito dat*"—and all the difficulties that attach to the exercise of foresight.

In another sphere we know, that to secure the return of soldiers to the land, a Parliamentary Commission has already recommended that immediately on the declaration of peace 20,000 cottages shall be built at or near the land they are to till, thus utilising the building skill now in the ranks and starting the homes for our men on the land. So far as the housing of workpeople near centres of aircraft production is concerned, this may be said to have been largely provided during the war; what has not been foreseen even on paper with a like definiteness is the absorbing of our aircraft output and the incidentals thereto. The financing and laying out of the specific postal routes, the location of the mechanics, repair men and tuners at the ports of departure and arrival, the housing of aerodrome officials, groundmen, accountancy clerks, the motor car service from town to aerodrome, the purchase of land and the establishment of title, the preparation of lists of flyers who may desire to find occupation at once instead of losing their skill by many months inactivity, the preparation of such drawings as may quickly allow of adapting war aircraft designs to their new uses, and the designing of such new weight carriers as may be more suitable to transport work; some or all of these things are needed if the industrial organisation of the factories is not to crumble during a long *hiatus*. Six months of idleness will disrupt any factory organisation and will lead to the paying off of workpeople and their consequent suffering and discontent. This six months of idleness must not occur.

Lord Cowdray's outlook, the more value since some kind of air ministry seems inevitable, and indeed most desirable after the war, was most sympathetic, but he saw and expressed the difficulty. One would like to feel assured that there may soon exist in the desks of private organising companies, brought together *ad hoc* under his ægis, a set of non-clashing plans of campaign on paper, in such detail as to be promptly workable. It is not necessary, but it would be useful if even the names of the intended personnel, most of which is, of course, with the colours, were laid out ready for the call to man the commercial, postal, wireless directional and incidental automobile and repair services.

It must be admitted frankly that the preparation of such schemes is not only laborious, but dishearteningly dependent on circumstances beyond the control of the organiser. Still, just as in peace time we work out complete plans for war condition which might arise, so in war time we do paper work for peace conditions, even if some of that paper work is wasted.

We have had one skeleton scheme to awaken the imagination, but we must have many to save the situation. We are confronted with the position that the mere housing of one month's output of the aircraft builders together with the returned war stocks, as soon as the rapid wastage ceases, is a matter of intense difficulty. Thus we are led to formulate the desire that sales of military aircraft to foreign countries, colonies, private users, exploitation companies at home and abroad shall be as prompt as they can possibly be made by every exercise of forethought, subject only to the retention of such devices and machines as are reserved by the military authorities for special reasons.

The policing of the air, though eventually a means of using a number of armed aircraft without appreciable alteration, can only at first consume aircraft on a small scale, however carefully such a scheme be laid out for expansion when the trade develops. It would be putting the cart before the horse to provide for more police than there are potential malefactors, or to provide for enforcing the "rules of the air" on a non-existent traffic.

Safety Provisions.

It is paradoxical to say that safety provisions, such as I have outlined, provide some of the most perilous of our subjects for foresight. There is no truer proverb than the French one which calls "la prudence, la plus triste des vertus," yet all administrations revel perforce in the gloomy business. They are egged on, in England particularly I think, by the "grandmother in the street," who unsparingly scourges as Government negligence any tolerance extended to venturesome enterprise. The example is to our hand. No car can be sold that cannot break the law, no user exists who does not break it, but the law remains at 20 miles per hour—lest there should be accidents and our Parliamentarians would be beaten with scorpions. We must stand by and pray that a more reasonable scientific and liberal spirit may infuse our safety code and our Board of Trade regulations when they appear.

Education of Personnel.

Technical education is, as we all know, one of the main activities of such an institution of aircraft engineers as our Society represents, whether we act directly by lectures and degrees or indirectly by premiums and scholarships and by effectively driving home the question of correspondence schools, techincal classes and university studies. The limit of this class of activity is for us the limit of this growing Society's membership and funds. The training of pilots was the subject of General Brancker's opening lecture this session, and both the Army and Navy have been very liberal in allowing officers to give us of their best; the Council has shown its enthusiasm for the work and the members by their crowded attendances have shown that they mean it to carry on.

The Future Production of Aircraft.

The whole of this lecture is directed to secure this end, and I will pick out only one of the sub-headings in my Table A for special explanation, namely, what I have called "load curve orders."

The bugbear of any production is the uneven distribution in time of the orders received. The intolerable burden of keeping a staff and a system to give a large rate of output for a short time and at short notice should, if possible, be put an end to by foresight. The Government will necessarily have certain orders of its own to distribute, and if it be found that, like the motor car trade, the industry is fed up by a "season demand," then the Government orders might, if possible, be distributed at such dates and in such a way as to even up the load curve.

I do not pretend to detail the good or bad effects if the Army, Navy, Post Office and Transaerion companies and foreign and Colonial Governments all placed all invited tenders on April 2nd and placed the whole of their orders on May 2nd, to the gorging of the lowest tenderers and the ruin of those who made correct estimates, but I do suggest that there existed no organisation prior to the war for appreciating the factory point of view in the distribution over a period of time of the business of ordering, and I also suggest that any industry with a first-class chance of a steady turnover has also a first-class chance of supplying an article at once profitably and cheaply—two terms which cannot always be justifiably found in juxtaposition.

The labour question is involved in this same consideration for the same reasons. The process of working "ca-canny" with a view to keeping in his job or making jobs for others is by far the most widespread economic mistake of the labouring class. The labourer's desire for his share of wealth is no doubt accompanied by the knowledge that it must be produced to be distributed, but this is overshadowed by the conviction that the firm may fail to get more orders, that a lull may come and that he can extend the period of activity between the lulls and secure jobs for his friends by working dead slow.

Abolish the lulls, and your thin excuse for slacking vanishes. I can only put the question, "Is it beyond the wit of man to level up the load curve?" I think not. Strikes and trade disputes are a separate question on which I do not touch.

Customs.

It seems to me that a trading aeroplane can cross a frontier unseen either at great height or by using clouds or at night. It can drop packages at spots pre-arranged with confederates, and can without alighting either return to its own land, or continue upon its through journey and escape being identified by a Customs House officer almost any night of the year.

In November, 1913,* a few remarks were made on the subject of Customs, and it was pointed out that a Customs inspection of the contents of aircraft on departure on behalf of the country of call was unthinkable, while inspection on arrival, or on dropping goods, involves all countries in having Custom House officials over so large a part of their surface as to suggest that the number of officials would be excessive. Britain is in an exceptional position, its Customs House has some 8,000 officials all over the country (as the Board of Customs has controls all indirect taxation), while the number of dutiable articles is very small. Hence, in the lecture we must base our ideas on the difficulties likely to be raised abroad. I think it may be decided to be impracticable and conducive to the stifling of aeronautics to make it obligatory on all entering aircraft to concentrate upon some agreed ports of entry. Such a concentration would be highly inconvenient and the delay of alighting would be contrary to the very first desideratum of an air service speed. It will be time enough later to consider the control required over aliens who might enter with diseases subject to quarantine.

Each arrival aerodrome would be liable at times to become a pandemonium of delayed and angry aeronauts. But there are other objections. One would hope to see journeys navigated on a course specially selected to utilise the enormous advantage of favouring winds, and minimise the delay and expense imposed by contrary winds, and therefore such journeys would be planned without the hampering influence of arbitrarily imposed places of call. These plans would seemingly be liable to alteration in the air according to the wind encountered, so as to obtain the best economic results. It will assist in making aeronautics a wealth-producing industry instead of a burden to the State if it is possible to secure that through journeys be made, when desired, without any compulsory stop across one country to another. A significant objection to any alighting for the purpose of Customs House inspection is the probable unfairness of a rule which would be easily evaded by the unscrupulous and which would be very costly to enforce even if the sporting smuggler were no longer with us.

In this tangle of difficulties there is a plan suitable for the first few years which has certainly the merit of simplicity, though probably no other, namely, that all air-borne goods should be free of duty; treating whatever advantages thereby accrued to the aerial transport companies as subvention in aid. For such a proposal this at least can be said, that the British community would not be unfavourably placed since almost every known commodity is taxed more highly elsewhere than in Britain.

In the contrary event of a decision to levy duty on air-borne goods we must consider the suggestion of a Customs police mounted on fast aircraft to pursue and watch traders.

There are many difficulties about doing this, they are probably even greater than those which are involved in a civil aerial police which we probably must have.

For Customs purposes it would be an anachronism to shoot down a suspected smuggler at sight; we cannot board an aeroplane in flight, nor can we know whether he is carrying sufficient hours' fuel to be capable of outdistancing our policeman, moreover his chance of giving his pursuer the slip by using the shelter of clouds and darkness is quite considerable.

At first, at any rate, it may be best to accept air-borne goods untaxed; the class of substances carried will only be those of light weight, or of high value for weight, and of these mostly the ones which derive some advantage from rapid transit. In England we should be chiefly troubled by jewellery, saccharine, tobacco, tea and cocoa, and I doubt if these would amount to a serious difficulty.

We should, of course, be inviseaging the issue of an indirect subsidy of an amount not easily knowable, but on the other hand we should economise on what promises to be abnormally heavy costs in collecting the duties imposed. The competition with taxed sea-borne or land-borne goods would not perhaps be very serious if we remember the greater cost both of transport and insurance of air.

As to the importation of foreign aircraft themselves, this is more easily controlled, because it involves alighting. It has been suggested previously that no preferential landing charges be made against foreign trader aircraft under certain circumstances of reciprocity, and accordingly an interval of stay in a country in excess of some preordained period might constitute importation for taxation purposes or alternatively the Gordian knot might be cut, and preferential encouragement given to our own aircraft (as war necessaries) on the basis of a bounty to aeroplanes built in the country and so avoid attempting the alternative of a tax on imported foreign aeroplanes.

Enemy Aeronautics.

Mr. Horace Darwin,* in a previous Wilbur Wright lecture, showed us the value of what he called "*inverting*" a mechanism with a view to its better understanding, thus often evolving either new results or suggestions for the solution of what previously seemed very difficult. The Gnome engine with its rotating cylinders might be called a classic example of "inversion" applied to the petrol engine. The bedside clock whose dial is rotated past a fixed pointer is an instance of a more popular kind which also has an aeronautical interest since it is utilised in almost every barograph.

This process of "inversion" can be used and is illuminating when applied to many war proposals entertained on behalf of one side which judges itself to be approaching to victory over the other. If the Germans had practised this they would have seen the comicality to us of their morning hate movement already indeed discredited annog intelligent Germans,† they might have apreciated the recruiting value to us of their early Zeppelin raids, and the pernicious world effect for themselves of frightfulness in Belgium and under the sea, however useful to them for awhile.

It has been suggested as obviously desirable after the war that the Central Powers should be for ever restrained from aerial activity or alternatively from any access to Allied landing grounds. Such a proposal should be examined in the light of the inversion process. It was, I think, Mr. J. Swinburne who said that whenever a proposal is described as obvious to the meanest intelligence that is a sign that it calls for careful scrutiny by those of better ability. I am told that the overland aerial route to India, via the territory of the Central Powers, appears to offer special advantages, if I correctly interpret a conversation I had with Lord Montagu recently, and I think he has studied the point; at any rate, until matters of this sort are very much clearer than they are now, it would be most unwise to lay down as fundamental desiderata notions which are only founded on our present bellicose attitude towards the enemy and not on a scientific appreciation of the results involved. At least we may be sure that the very last thing we want is to ensure for the Germans the exclusive use of the easiest aerial run to India and the East.

For Imperial and Colonial aeronautics it would be suitable to repeat the same table as was shown for purely British questions, with the introduction of widely different and in some cases very promising aspects due to the greater distances, the absence of postal facilities, the great expense of land transit, the absence of roads, the unexplored and unmapped and unsurveyed regions, and sometimes the peculiarly regular atmospheric conditions. There will be found advantages for rapidly conveying administration officials to points of temporary interest or trouble. The labour question also requires special treatment and so do the convention for intercommunication between the Colonies themselves and with the Motherland.

Here is an immense programme for foreseers and prophets. I believe there was for a moment a slight tendency to prejudice against the formation of an Air Board Committee to inquire into the matters which I have here suggested as a suitable field for foresight, but I now believe that since the first meeting, under Lord Northcliffe, this preliminary doubt has in large measure been dispelled. Whether the Aerial Transport Committee, now sitting, on which this Society is ably represented by its Chairman, General Ruck, C.B., and on which I am sure we are all glad to know that Lord Sydenham has consented to serve, solves all these problems or not, we can feel at least that there exists somewhere a somebody who will make an effort towards the elucidation of some of them.

* M. O'Gorman. The *Aeronautical Journal*, pp. 27-28-29, in discussion before the A.S. of Mr. Wallace's paper on "The Right to Fly."

* Horace Darwin, F.R.S., *Aeronautical Journal*.

† Alec. W. G. Randall, p. 750, *Contemporary Review*, June, 1917.

SIDE-WINDS.

CONVINCED himself of the immense possibilities which are before aviation, Mr. J. A. Whitehead has determined that the "man in the street," or rather the "man in the cinema palace," shall have an opportunity of being kept informed as to the progress of aviation. Hence the "Birth of an Aeroplane," a Whitehead film of which a private view was given at the Pathé Roof Garden Theatre on June 12th. In this attractive and illuminative picture the actual process of building a modern aeroplane is followed through its many stages, from the felling of the trees to provide the necessary timber, to the time when the machine is seen winging its way over the front in Flanders. In the splendidly-equipped Whitehead workshops, busy workers are seen at their tasks of producing the many wood and metal parts which go to the making of an aeroplane of to-day, and, when the machine has been assembled, it is put through its paces in fine style by Mr. H. Sykes at the Whitehead aerodrome, the picture giving a very good idea of the process of getting off. The picture concludes with a series of views taken from an aeroplane over the firing line, showing a badly-strafed village, &c.

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DAME RUMOUR works on very unpromising material oftentimes, but it is astonishing that the recent announcement that Mr. R. W. Coan, of the Aluminium Foundry, 219, Goswell Road, E.C., had accepted the Presidency of the Clacton-on-Sea Advancement Association should have given rise to a belief that Mr. Coan is not only retiring from business, but also intends resigning the many offices he holds in various fraternal and benevolent associations in and around London. Anyone who knows Mr. Coan will not need to be told that it is "only a rumour"; but possibly it is as well to nail this absurdity to the counter. Not only is Mr. Coan devoting the whole of his business hours to his firm, particularly now when he is so busy with war work, but he is just starting to operate two large extensions to his foundry, where he hopes to continue to "Cast Clean Crank Cases" for many years to come. Also, while devoting a portion of his summer week-ends to the interests of Clacton-on-Sea, he has no intention of neglecting his interest and activities in the many other organisations of which he is a member.

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ECONOMY is the order of the day even in the matter of dope, and Messrs. Cellon, Ltd., have, therefore, got out a poster for exhibition in dope shops emphasising the need for care in handling dope to see that none is wasted. The following seven little simple rules should be enforced as far as possible:—

(1) Always keep all drums screwed up.

(2) Never leave materials in the small containers when not in use, and so allow the solvents to evaporate.

(3) Do not completely fill a container when the job in hand only requires half that quantity.

(4) Do not fill the brush when there is only a small portion of fabric to cover, or when doping near the edge of a plane. Drippings on the floor are a serious source of waste.

(5) Dope is a thick liquid, so care must be taken to completely empty drums before returning them to us. Drums should always be turned upside down and allowed to drain.

(6) Keep your brushes clean.

(7) Check carefully the weight of deposit on fabric so as to get the increase called for in the doping schemes.

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REFERENCE has already been made in these columns to the A.C. light car, which has such a vogue among flying officers. Many will doubtless be interested to hear that a booklet has just been published dealing fully with the vehicle, and copies can be obtained from Auto-Carriers (1911) Ltd., Ferry Works, Thames Ditton, Surrey. Not only is the car described in detail but a lot of useful testimony from users is set forth in order to show the low running costs in the hands of private owners. Thus, one lady's running expenses for 5,000 miles are given as just over £33, while the costs of another user for a similar distance worked out to 2d. per mile, despite the fact that one-third of the petrol cost 2s. 9d. per gallon. A vivid story is told of the climbing of Honister Pass from the Buttermere side of Lakeland, a test which proves more than anything else the capabilities of the little A.C.

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NOTICE.

IN consequence of the great pressure on our columns, it has been necessary to hold over "Answers to Correspondents," as well as other regular features.

The Battle of Messines Ridge.

MR. PHILIP GIBBS, writing to the *Daily Telegraph*, on June 7th, said:—

"For a long way behind the line our heavy guns laid down belts of shell-fire, and many of the enemy's batteries kept silent. Our gunners smothered his batteries whenever he revealed them to the airmen. Those flying men have been wonderful. A kind of exaltation of spirits took possession, and they dared great risks and searched out the enemy's squadrons far over his lines. In five days from June 1st, 44 separate machines were sent crashing down, and this morning very early flocks of aeroplanes put out to blind the enemy's eyes and report the progress of the battle."

Reuter's correspondent at the British Headquarters, writing on June 7th, said:—

"I have spoken of the magnificent work of the Flying Corps in the area of this offensive. Let me cite a few figures which will give convincing point to this richly-merited tribute. On June 1st they destroyed two and drove down six Hun machines. On June 2nd the respective totals were one and three. On the 3rd, one and two; on the 4th, nine and four; and on the 5th, eight and eight. Our total aerial casualties during the days named were 10 in all. The average number of hours of flight for all the machines engaged during this time was about 600 a day."

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PUBLICATIONS RECEIVED.

With Botha and Smuts in Africa. By W. Whittall. London: Cassell and Co., Ltd. Price 1s. net.

The International Military Digest Annual for 1916. New York: Cumulative Digest Corporation.

The Flying Book: The Aviation World and Who's Who. London: Longmans, Green and Co. Price 3s. 6d. net.

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NEW COMPANIES REGISTERED.

BRITISH AERIAL TRANSPORT CO., LTD., 90, Cannon Street, E.C.—Capital £100, in £1 shares. Directors are to be appointed by the subscribers.

GLOUCESTERSHIRE AIRCRAFT CO., LTD.—Capital £10,000, in £1 shares. Acquiring the business carried on by A. W. Martyn at Cheltenham as the Gloucestershire Aircraft Co. First directors: G. H. Thomas (chairman), H. Burroughes, G. A. Peck, A. W. Martin (managing director), T. O. Williams and D. Longden.

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Aeronautical Patents Published.

Applied for in 1916.

The numbers in brackets are those under which the Specifications are printed and abridged, &c.

Published June 14th, 1917.

5678. W. J. H. KING. Torpedoes, aircraft, &c. (106,299).

8446. J. W. PARKER AND E. GOLDSMID-ABRAHAMS. Propulsion of aircraft. (106,352).

Applied for in 1917.

The numbers in brackets are those under which the Specifications are printed and abridged, &c.

Published June 14th, 1917.

638. J. P. CASTLE. Means for securing tension wires in aeroplanes and other aircraft. (106,441).

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